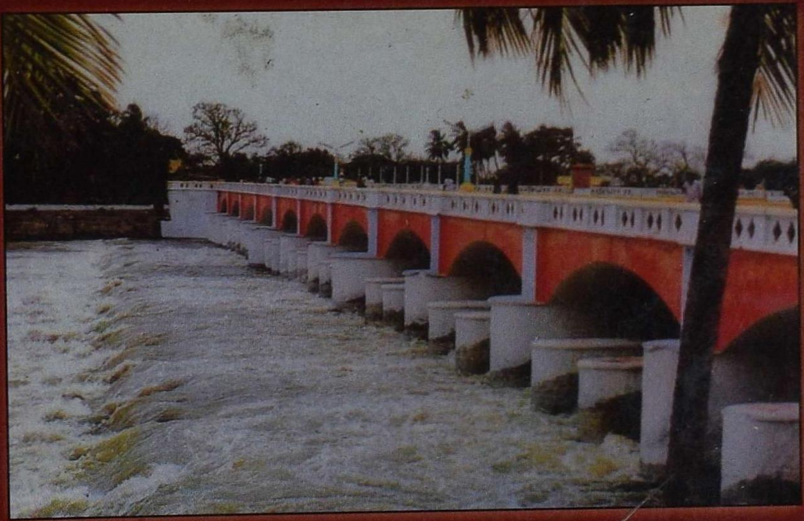
HISTORY OF IRRIGATION DEVELOPMENT IN TAMIL NADU

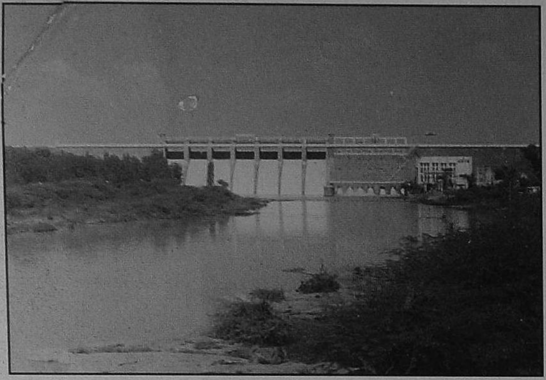


इनसिड – INCID

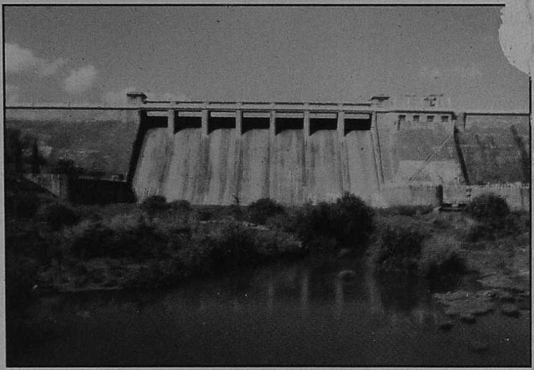
भारतीय राष्ट्रीय सिंचाई एवं जल निकास समिति
(जल संसाधन मंत्रालय, भारत सरकार द्वारा गठित)

INDIAN NATIONAL COMMITTEE ON IRRIGATION AND DRAINAGE
(CONSTITUTED BY MINISTRY OF WATER RESOURCES, GOVT. OF INDIA)

NEW DELHI
MARCH 2001



KRISHNAGIRI DAM



MANIMUTHAR DAM

ALIYAR DAM

Front Cover Photo : Grand Anicut

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FOREWORD

Irrigation in India has a very old history. Mettur dam and Grand Anicut on Cauvery, Krishna anicut, Godavari anicut, Mahanadi delta systems, Eastern and Western Yamuna canals and Dehri-on-Sone anicut are some of the old canal systems where irrigation was practiced with great success. Even earlier to this, tank irrigation was followed in different dynastic periods in different parts of the country. We hear about irrigation by our ancestors even during vedic period. Some of the practices adopted in the ancient period were quite cost-effective. It is very essential that compilation of existing information on age old practices is brought out state-wise in a systematic manner giving not only chronological events of development of irrigation from time to time but also bring the agriculture practices prevailing in those times. This helps in preserving the record for posterity and also in adopting some of the age-old cost-effective practices with suitable modifications in the present day irrigated agriculture.

In pursuance of its objectives and functions, the Indian National Committee on Irrigation and Drainage (INCID) is publishing the historical appreciation of development of irrigation and drainage, which will disseminate information related to irrigation and drainage. INCID has taken-up the publication of "History of Irrigation in Tamil Nadu and Andhra Pradesh". Ministry of Water Resources has sanctioned a research project with the objective to prepare documents bringing out irrigation practices and management adopted in different periods in the states of Tamil Nadu and Andhra Pradesh, under the centrally sponsored research programme of river valley and flood control schemes.

Initially this work was started by INCID on its own and subsequently entrusted to Dr A. Mohanakrishnan, Former Chief Engineer, Tamil Nadu and Chairman, Cauvery Technical Cell, Government of Tamil Nadu. Dr. Mohanakrishnan and his associates prepared this report based on the data collected from various sources such as State Government, National Archieves, Universities, etc. The draft status report on "History of Irrigation in Tamil Nadu", was sent to various organisation like CWC, State Government, Planning Commission and some Agricultural Universities for their comments. Comments from some of the organisations were received. The INCID Sub-Committee-II on "Irrigation Performance Assessment, History, Training and Research and Development" during its meeting held on 21st June, 2000 discussed and approved the draft report with some minor variations which have been carried out by INCID subsequently.

The present publication contains seven chapters and covers irrigated agriculture in Sangam age, development of irrigation during pre-British rule i.e. during the periods of Cheras, Cholas, Pandyas and Pallavas, during British rule and after Indian Independence. The report also covers future perspectives of irrigation development in Tamil Nadu.

INCID expresses its sincere gratitude to Dr A. Mohanakrishnan and his associates for providing an excellent documentation of available information in this Status Report. INCID is also grateful to Ministry of Water Resources for providing grant for the R&D proposal on "Status Report on History of Irrigation for Andhra Pradesh and Tamil Nadu". The efforts put in by Shri P.B.Parabrahmam, Member-Secretary, INCID, Shri R.V.Godbole, Consultant and Shri V.U. Koundanya, Additional Chief Engineer, INCID & WAPCOS for updating and editing the text are very much appreciated. The hard work put in by Shri V.K. Gaur, Shri Surjeet Kumar and Km. Sangeeta Mohan Sharma of INCID Secretariat, who diligently typed the report deserves to be complimented.

Special thanks are due to Shri P.L. Diwan, Chairman and Managing Director, WAPCOS (India) Limited for his support to INCID and providing all infrastructure facilities to INCID Secretariat in publishing this document.

It is hoped that this report would be a model for similar reports for other States and will be useful to personnel working in different State Irrigation departments/agencies as a reference book.

Place : New Delhi
Date : March, 2001

(Dr. B.K. MITTAL)
Chairman, INCID
&
Central Water Commission

ABOUT THE AUTHOR

PROFESSOR ANGADU MOHANAKRISHNAN, graduated in Civil Engineering from the College of Engineering, Guindy with first Class honours in 1948 and later took his Master of Science in Engineering in 1961. Later, he was awarded the degree of Doctor of Science (Honoris Causa) by the Anna University, Chennai on 4th September, 1997.

He joined the Public Works Department of the erst while Madras State (now Tamil Nadu) in June, 1948 and was responsible for planning, design and execution of major irrigation projects in the State. He worked for five years in the College of Engineering, Guindy as Professor of Civil Engineering, handling subjects like Hydraulics, Fluid Mechanics, Irrigation, Dam Construction, Water Management, etc. He retired as Chief Engineer, Public Works Department, Government of Tamil Nadu in December, 1984.

After retirement, he was Irrigation Advisor with the Government of Tamil Nadu and Director, Irrigation Management and Training Institute (IMTI) for a period of two years. He was also Chairman of the Expert Committee on Telugu-Ganga Project and since 1990 is working as the Chairman of the Cauvery Technical Cell to present the case of Government of Tamil Nadu before the Cauvery Water Disputes Tribunal. Being Advisor to the Government, he was consulted on all aspects of water resources in the state including interstate problems.

He has authored four technical books including the present publication and contributed more than 60 technical papers on irrigation and water resources to journals and other organisations. He is a life member of Institution of Engineers (India), Central Board of Irrigation and Power and Indian Water Resources Society.

HISTORY OF IRRIGATION DEVELOPMENT IN TAMIL NADU

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CHAPTER 1

IRRIGATION - AN INTRODUCTION

1.1 Inspite of the large scientific and technological input that has gone into the several aspects of irrigation engineering, irrigation practice continues to be an art played by experienced actors at the most challenging circumstances. The actors are many, who with different aspirations, different attainments and different status in life, many at the grass root level, the engineers, the agronomists, the economists, the sociologists, the farmers, the headenders, the tailenders, the farm labourers and so on are all anxious to get something more from the Mother Earth than what they are now getting and thus improve their earnings. Mother Earth yields much better if favoured with irrigation. The ultimate objective is to produce food and fodder for the ever, increasing population, human and bovine.

When the cave man preferred to change from the raw food to the cooked food, he turned to the land to grow his needs and settled on the banks of the streams in the valleys and the estuaries where he could find the water, the most essential element for life, next to air. When he could not maintain the crops grown in between the rains brought by nature, he turned to the water resources available to supplement the rain. Thus started Irrigation and there is no historical evidence as to when this could happened in different parts of the world. Irrigation should have thus evolved as an art in ancient times and developed over centuries to meet the necessities of droughts and floods.

1.2 Precipitation is the only source for water. Man has been propitiating his Gods and Goddesses to bring him rain. In Tamil Nadu one can see the Goddess 'Mariamma' being worshipped in almost every village in some form or other. 'Mari' means rain and Mariamma is the Goddess to bring rain. The festivals in those temples can be seen to be coinciding with the arrival of the first showers from the monsoon.

The Vedic texts, the Puranas, Tamil Literary works abound in references to the rain that brings water But historical references to the use of this water for irrigation are few. The compilation "HYDROLOGY IN ANCIENT INDIA" brought out by the National Institute of Hydrology in 1990 as India's contribution to the International Hydrology Programme (IHP) has brought out valuable information on various component processes of hydrology and their interaction seen in ancient Indian literature right from Vedic Age.

From the references made to the existence of wells, ponds, tanks and canals, we are able to infer that irrigation was in practice in India and also in the southern peninsula long before the Christian Era. An attempt is made to cull out these references and presented in the following chapters with authenticity.

But one thing is certain, that a researcher who studies the irrigation systems in Tamil Nadu will come to the conclusion, that development of irrigation was a gradual process moving from one stage to another, from wells and springs to small storage tanks and there on to diversion works and channels and finally the large storage reservoir and their commands.

1.3 Before proceeding to record, the irrigation development before and after the advent of the British, it may be gratifying to trace the Community Management of the irrigation works that existed at that point of time.

The community as a whole was responsible to the needs of management of floods and droughts that of course would affect them individually and collectively. Whenever the local streams, drains and rivers rose in floods uncontrollably during the monsoon period, the villagers as a mass, rose and ran to give a helping hand in saving their abodes. They had devised simple ways of fighting the floods by raising the banks, plugging breaches promptly with nanal grass, hay and other materials available handy to reduce the force of flow as they excavated and dumped cartloads of soil and muck. Over a period, people in Tamil Nadu had developed a traditional approach to close the breaches that occur in channels, streams and river courses. Two rows of casurina piles are hammered down from both ends of the breach, the mid space being simultaneously filled

with such nanal grass, hay and other leafy vegetation cut and bundled and packed as the earth is thrown in and trampled over to form the temporary bund to be strengthened later. When both ends are to meet, naturally the force of water will be high and this is tackled at great speed with large stock of material collected and the centre portion is plugged at one stroke. Instances of fighting such large floods in the rivers like Cauvery, and Vaigai have been eulogized by poets, bards even in ancient times.

1.4 The management of the water stored in tanks and ponds got streamlined over a period of time and no difficulty was generally seen in the normal times. Even the distribution of waters withdrawn from a sluice in the tank among the farmers was so well institutionalised long time back that such distribution was accepted by tradition and is generally followed even today.

The following can serve as a good example to illustrate the above :

The Chembarambakkam is an irrigation tank close to Chennai with a capacity of 88 Mcum and a registered ayacut of 6,192 hectares. The ayacut map (Map 1.1) of an outlet from the canal taking off from sluice No.2 of the tank is enclosed. There is an unwritten convention among the ayacutdars under this outlet to use waters on a weekly rotation. They have seven locations of temporary diversion bunds. The portions of the ayacut served by these temporary diversions for each day is shown coloured differently. The distribution among the fields to be served during the day is again by mutual arrangement. One among the beneficiaries of the unit acts as the Co-ordinator and the leader for water distribution within the unit. The extent under each diversion bund (Kondam) vary widely as could be seen. This variance is so designed that the time for irrigation of each unit is approximately the same because of the elevation of the land with reference to the field bothies and other factors. Thus it could be seen that under the present management there is no Government interference and the whole thing is left to the beneficiaries to be decided for their mutual benefit.

It is at times of drought that the irrigation committees and village assemblies rose upto the occasion and managed the use of whatever water that was available by consensus. The areas that could be supported, the crops that could be raised were all decided through discussions and accepted. Others had to reconcile to the fate of drought and seek famine relief work to earn wages or find ways and means of supporting at least a part of their crops by sinking wells and extracting the ground water.

Social response to the need for safeguarding and maintaining the irrigation structures was pretty good till recent times. The village administration was effective and the village headman who was usually an elderly person was duly respected and his words and judgement after arbitration were given due weight and accepted. The public property assets like the temples, temple lands, grazing lands, trees, the irrigation works were all safeguarded with religious fervour, no one could dare cut a live tree in a common place and get away, for, every one in the society kept watch of these common assets. There was integrity in the village society and a fear for the village court.

1.5 'Kudimaramath' literally means maintenance and repairs ('maramath') by the farmers ('Kudi') themselves. The word on the tradition of 'Kudimaramath' was in vogue in almost all parts of the present Tamil Nadu. This was essentially meant for keeping the distribution system under the canals and channels of tank irrigation systems in good conditions by the farmers for their own benefit by a system of contributing labour. The rate of such contribution usually went with the land holding size. Where direct labour could not be arranged equivalent amount was collected in cash. Desilting the field channels and the feeder channels that carry the flows just before the monsoon starts or irrigation is to be started, reforming the bank, clearing weeds are the essential tasks performed in this way. In the Cauvery delta which is the largest single block of irrigated land in the state, all the 1505 'A' class channels and the 19,000 km of branch and minor channels in the old delta were being maintained only through "Kudimaramath' till recently.

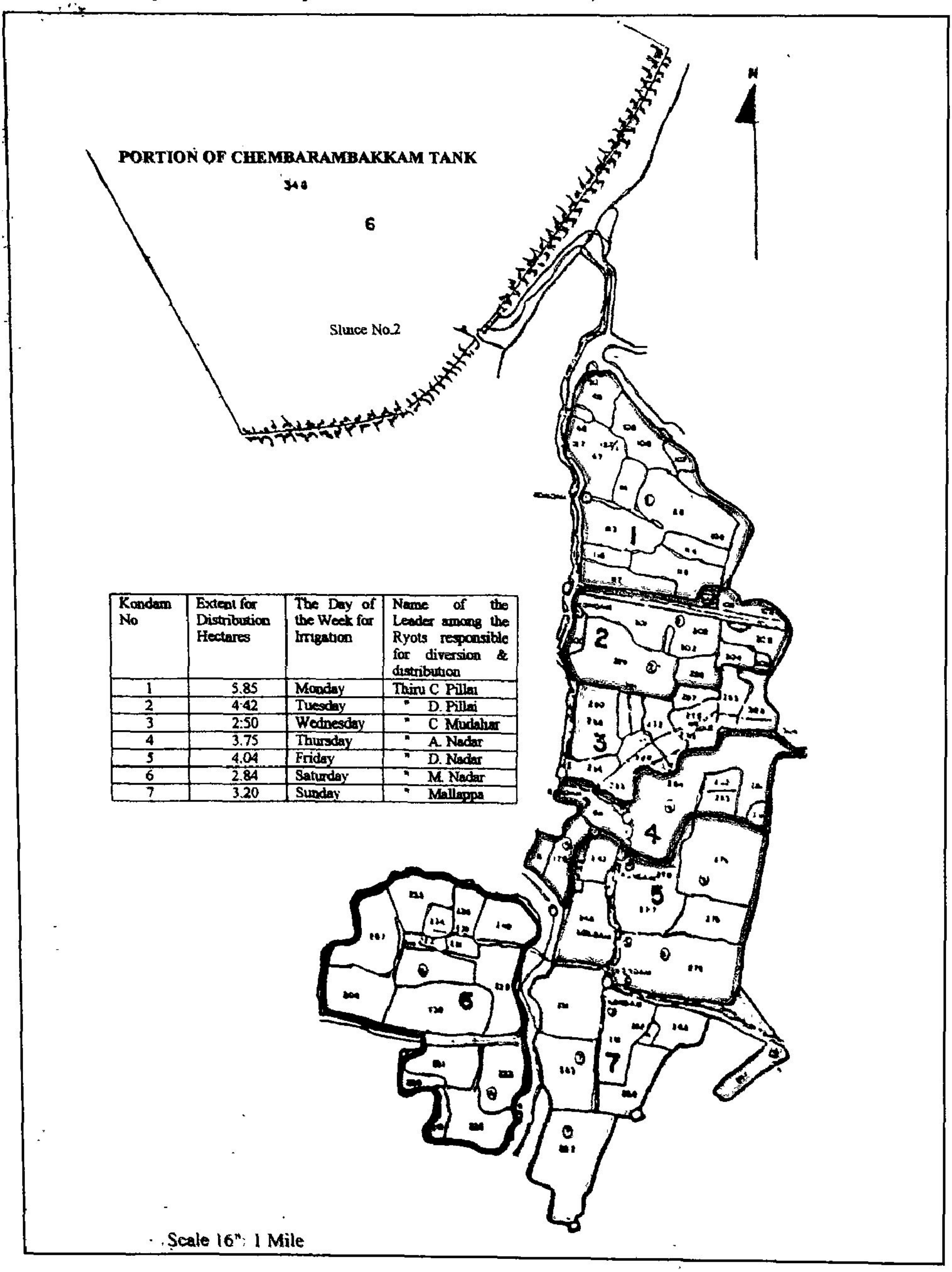
An unique system of irrigation maintained through springs in the Palar river in Tamil Nadu could provide a good example of the working of the Kudimaramath system. River Palar rarely gets floods and when flows

occur during the north east monsoon, for a few days the heavy sandy bed gets recharged and renews a good aquifer to be tapped. Villages on Palar bank have acquired a traditional right of tapping this aquifer. Each *village has a spring head 'Kasam' identified in the bed of the river. By understanding, one village will not* interfere with the **'Kasam'** of the other village lest its water potential is disturbed. 'Kasam' is nothing but a deep excavated pit in the sandy bed where springs appear. The spring water was led through a cut in the river bed, carried through a small channel along the bank and then interior to irrigate a stretch of lands spread like a ribbon along the river bank, inland. Every day early in the morning farmers with a spade on their shoulders moving on to the 'Kasam', clear up the 'Kasam' to rejuvenate the spring and walk along the channel ensuring the spring water flows on to feed the designed ayacut. This goes on day after day until the springs dry up in summer by which time their crop would have matured. This is a typical example of 'Kudimaramath' in action and fortunately in this particular case the system is still alive.

The principle of participatory approach with cooperation for the upkeep of the water resources and for the distribution of irrigation benefits, which we are now advocating through participatory irrigation management (PIM), was already there for centuries generally accepted and honoured by commitment until recently, when those values started receding to the background. The construction, operation, maintenance and *management are the necessary pillars to support and get the best out of an irrigation system* and in all these phases, the involvement of the beneficiary, has been there over centuries. It should be our endeavour to rejuvenate the healthy tradition of building up the expertise through participatory management.

Map 1.1

Ayacut Served by an Outlet from Sluice No. 2, Chembarambakkam



Kondam No	Extent for Distribution Hectares	The Day of the Week for Irrigation	Name of the Leader among the Ryots responsible for diversion & distribution
1	5.85	Monday	Thiru C Pillai
2	4·42	Tuesday	" D. Pillai
3	2:50	Wednesday	" C Mudaliar
4	3.75	Thursday	" A. Nadar
5	4.04	Friday	" D. Nadar
6	2.84	Saturday	" M. Nadar
7	3.20	Sunday	" Mallappa

CHAPTER 2

TAMIL NADU - A PROFILE

2.1 The Tamil Nadu State which was known as the Madras State till 1967, lying in the southern most part of India, lies between east longitudes 76^0-15' and 80^0-20' and between north latitudes 8^0-5' and 13^0 35'. The geographical area of Tamil Nadu is 1,30,160 sq.km., which is 4% of the geographical area of the country and holds 7% of the population of the country. Bounded on the north by Karnataka and Andhra Pradesh, on the west by Kerala and on the east and south by the Bay of Bengal and the Indian Ocean, Tamil Nadu has a coastline of about 920 km and a land boundary of 1200 km. It lies entirely within the tropical zone and hence has abundant sun. The land extending south from the Deccan Plateau and interspersed with the ranges of the Eastern Ghats has a mild dip towards south and east. The administrative map of Tamil Nadu is at Map 2.1.

The State can be broadly divided physiographically as the hilly western areas and the eastern coastal plains. The Western Ghats run along the western end with the hill groups of Nilgiris and Annamalais occupying the north-western part. Palani hills, Varshanad and Andipatti ranges are the major off shoots of the ghats in the south. Javadis, Shevarayan, Kalrayans and Pachaimalais are the broken hill ranges forming the Eastern Ghats which of course unlike the Western Ghats can be traversed through, in a number of places. The plateau between these hills is at an average elevation of 305 m (1000 ft) rising towards west. Doddapettah peak in the Nilgiris is at EL 2636.5 m (8650 ft).

Physical features of the Tamil Nadu State are shown in Map 2.2

2.2 Western Ghats form a complete barrier and no river passes through them. Eastern Ghats are not a complete watershed and as a result, rivers pass through them, the notable among which is the river Cauvery. Western Ghats forming a high barrier intercepts the south-west monsoon and most parts of the state lying on the leeward side miss the benefit of this more dependable monsoon. Of course the influence of the north east monsoon brings in intense heavy rainfall during the months of October to December in spells often accompanied by cyclonic depressions and cause floods and damages.

Season wise normal rainfall for the state is as under :

Winter Season	January to February	42.2 mm
Summer Season	March to May	136.5 mm
South West Monsoon	June to September	307.6 mm
North East Monsoon	October to December	438.7 mm
	Annual Total	**925.0 mm**

The high rainfall regions are the Nilgiris, the coastal belt of the South Arcot, Chengalpattu, MGR districts and Palani hills.

Western parts of the south Arcot, Chengai MGR districts, whole of north Arcot Ambedkar, Thiruvannamalai, Sambuvarayar, eastern parts of the Salem, western part of Thanjavur, Nagapattinam Quaid-E-Milleth, eastern and northern parts of Trichy, eastern part of Madurai, Dindigal Anna, northern part of Ramanathapuram, Pasumpon, Kamarajar, Coimbatore and Salem can be termed as medium rainfall regions.

Central and southern parts of Ramanathapuram, Pasumpon, Kamarajar, Chidambaranar and Tirunelveli districts and central part of Coimbatore, central and western parts of Madurai, Dindigul Anna and the southern half of Tiruchirapali are the low rainfall regions.

The average number of rainy days are 50 per year the highest being 106.2 days and 85.9 days in Nilgiris and Kanyakumari districts respectively. The lowest is 45.8 days in Ramanathapuram, Pasumpon and Kamarajar districts.

2.3 The pre-dominant soils are red loam, laterite black, alluvial and saline soils.

- The red loam soil occupies a large part of the state particularly interior districts including the coastal districts. It is found predominently in Chengalpattu MGR, South Arcot, North Arcot Ambedkar, Salem, Dharmapuri, Ramanathapuram, Coimbatore, Trichy, Pudukottai, Thanjavur, Pasumpon, Kamarajar, Madurai, Dindigul, Nagapattinam Quaid-E-Milleth, Chidambaranar, Tirunelveli and the Nilgiris. The red or brown colour of the soil is attributed to the diffusion of iron content.
- The laterite black soil is clayey and generally brick red with a little titanium present. It is found in parts of Chengalpattu MGR, Thanjavur, Nagapattinam Quaid-E-Milleth and the Nilgiris districts.
- The black clayey aluminium rich soil is known as black cotton soil and this is found in parts of Coimbatore, Madurai, Dindigul, Chidambaranar and Tirunelveli and in patches in the districts of Chengalpattu MGR, North Arcot Ambedkar, Salem, Dharmapuri, Ramanathapuram, Kamarajar and the Nilgiris.
- The Coastal and deltaic areas of Thanjavur, Nagapattinam Quaid-E-Milleth, Tiruchirapalli, South Arcot, Chengalpattu MGR, Tirunelveli, Chidambaranar, Kanyakumari, Ramanathapuram and Pasumpon districts have alluvial soil.

  Saline soils are found in the regions of poor drainage and high evaporation. It is found in patches in all the districts except Kanyakumari and the Nilgiris.

2.4 There are 33 river basins in Tamil Nadu, of which the Cauvery basin alone covers about 34% of the state's geographical area. South Pennar, Vaigai, Tambaraparani and Kodaiyar are the important river basins besides Cauvery. All the rivers are east flowing except the river Kodaiyar in Kanyakumari district, which flows south-west to infall into the Arabian sea. The river basins are shown in Map 2.3.

None of the rivers except river Cauvery are perennial. They swell up if the north east monsoon is good and soon dry up. This points out to the need of storage schemes wherever possible to meet the needs of the crops. The system of minor irrigation tanks admirably foots this bill in this particular physiographic scenario.

The surface water potential generated in the state is estimated at about 35,726 Mcum (1,261 TMC). About two thirds of the state being of rocky formation the ground water potential is low. It is estimated at 30,160 Mcum (1,065 TMC). Unfortunately there is over exploitation of ground water in many parts of the state and the dark blocks are increasing.

2.5 The population of Tamil Nadu as per 1991 census is 55.86 Million with a sex ratio of 974 females to 1000 males and the density is 429 per square km. Tamil Nadu has rigorous programme for population control and the birth-rate has fallen from 31.4 per thousand in 1971 to 20.7 per thousand in 1991.

The literacy is 62.61 per cent, which is as high as 85 to 90 per cent in urban areas.

Total workers constitute 30.54 per cent of the total population as in 1991 and of these 5,664,090 (33.2%) are cultivators and 7, 896, 295 (46.3%) are agricultural labourers. In general the state's per capita income is marginally good and yet 32.8 per cent are below poverty line as per 1987-88 data.

2.6 Based on rainfall distribution, irrigation pattern, soil characteristics, cropping pattern and other physical, ecological and social characteristics, Tamil Nadu state is classified into seven distinct agro-climatic zones delineated as follows:

Sr. No.	Zones	Districts/Taluks covered in the Zone
i	North Eastern Zone	Chengalpattu MGR, North Arcot, Ambedkar Thiruvannamalai Sambuvarayar, South Arcot (excluding Chidambaram and Kattumannarkovil taluks) and Ariyalur and Perambalur taluks in Tiruchirapallia district.
ii	North Western Zone	Dharmpuri district (excluding Tiruchengode taluk) and Taluk of Tiruchirapalli district.
iii	Western Zone	Periyar & Coimbatore districts, Tiruchengode taluk of Salem, Karur Taluk of Tiruchirapalli and northern parts of Madurai.
iv	Cauvery Delta Zone	Cauvery Delta area in Thanjavur, Nagapattinam Quaid-E-Milleth and Musiri Tiruchirapalli, Lalgudi, Thuraiyaur and Kulithalai taluks of Tiruchirapalli districts, Aranthangi taluk of Pudukottai and Chidambaram and Kattumannarkoil taluks of South Arcot district.
v	Southern Zone	Ramanathapuram, Kamarajar Pasumpon, Chidambaranar and Tirunelveli districts, Dindigul, Natham, Melur, Thirumangalam, and Madurai South and Madurai North taluks of Madurai districts and Pudukottai district excluding Aranthangi taluk).
vi	High Rainfall Zone	Kanyakumari.
vii	Hilly Zone	Nilgiris, Shevroys, Elagiri-Javadhi, Kollimalai, Pachaimalai, Annamalai, Palanis and Podhigaimalai.

2.7 Broad Land use pattern in the state is given in Table 2.1 :

Table - 2.1 : Land use in Tamil Nadu

S. No.	Description	Lakh hectares	Percentage
1	Geographical area	130.16	100.0
2	Net sown area	57.55	44.3
3	Area sown more than once	12.03	-
4	Gross sown area	69.58	-
5	Area irrigated	32.70	-
6	Forests	21.49	16.5
7	Non agriculture use	18.64	14.3
8	Pasture and grazing	1.17	0.9
9	Culturable waste	2.89	2.3
10	Miscellaneous tree crops	2.24	1.8
11	Current fallows	10.44	8.1
12	Other fallows	10.08	7.9
13	Barren lands	5.66	3.9
	Total	130.16	100.0

Source: Tamil Nadu - An Economic Appraisal 1994-95 issued by the Evaluation and Applied Research Department, Government of Tamil Nadu.

2.8 Agriculture is the key sector in the state contributing to about 24% of the Net State Domestic Product (NSDP). During 1994-95, an year of good monsoon and the net and gross cropped areas were 59.01 lakh ha. and 71.58 lakh ha. respectively, the intensity of cropping being 121.3% on an average. The net and gross area irrigated was 28.0 lakh hectares and 35.45 lakh hectares respectively, the intensity of irrigation amounting to 126 6% The food grain production was 97.52 lakh tonnes. The productivity however continues to be low averaging to 2.051 tonnes/hectare in respect of food grains.The productivity of Rice in 1993-94 was 2.927 tonnes/ hectare as the State average whereas the figure was seen to be 4 to 4.5 tonnes in some districts. The per capita food production is only 141 kg and the state occupies the 12th position is respect of per capita food production.

2.9 The irrigation potential and achievement as in 1994-95 is as under :

	Irrigation Potential		
	Target	**Achieved**	**Percentage**
Surface Water (Major, Medium and Minor Irrigation Projects)	2.500Mha	2.433Mha	97%
Ground Water (Minor Irrigation Projects)	3.147Mha	1.573Mha	50%
Total	**5.647Mha**	**4.006Mha**	**71%**

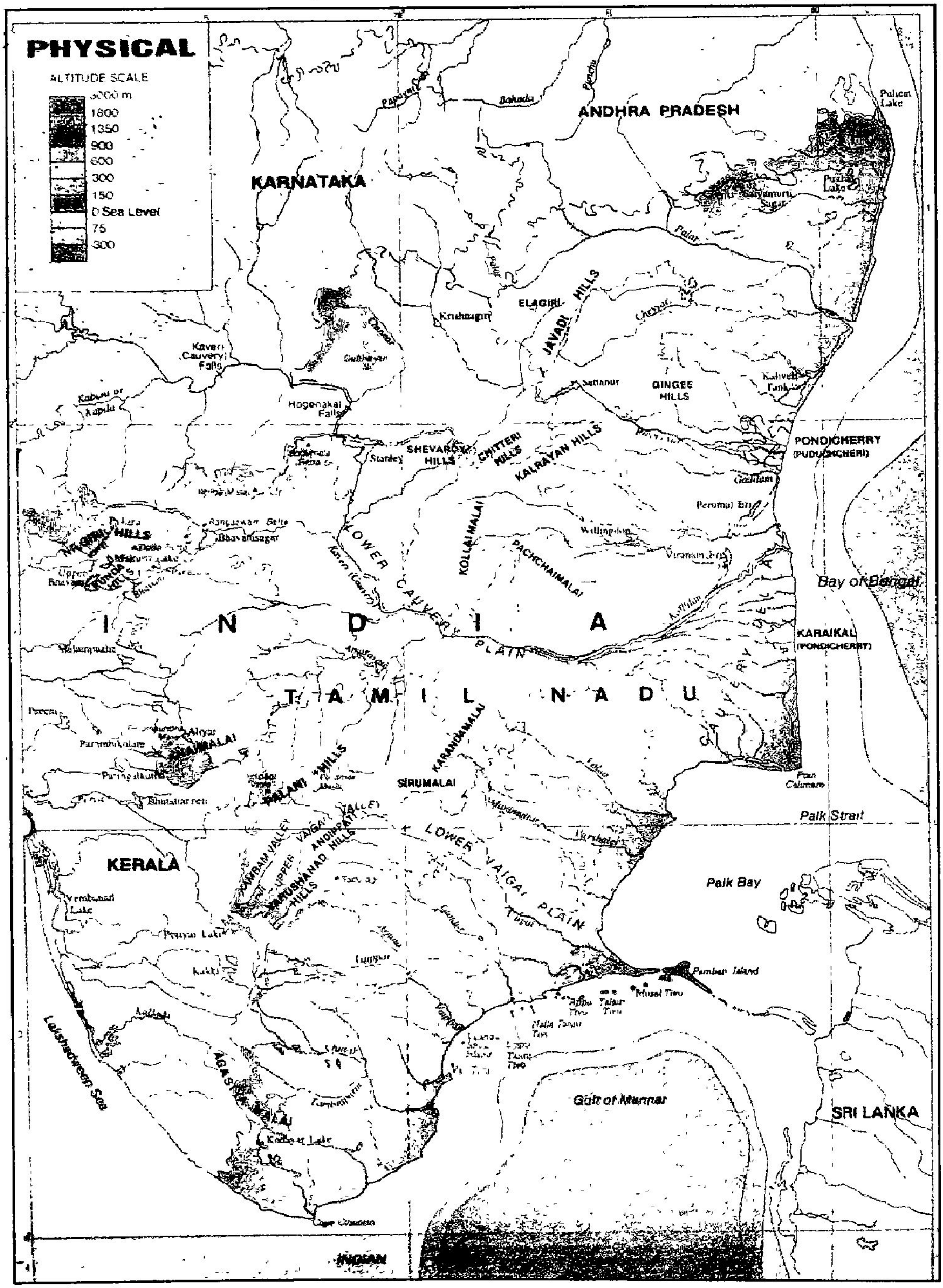
Tamil Nadu, which has been one of the pioneers in the country in harnessing the water resources, is now starved of further sources having exhausted most of its surface water potential. It is largely pinning its hopes on the possibilities of trans-basin diversions from surplus to deficit basins which holds the key for an overall development of this country.

Map 2.1

Map of Tamil Nadu - Administrative

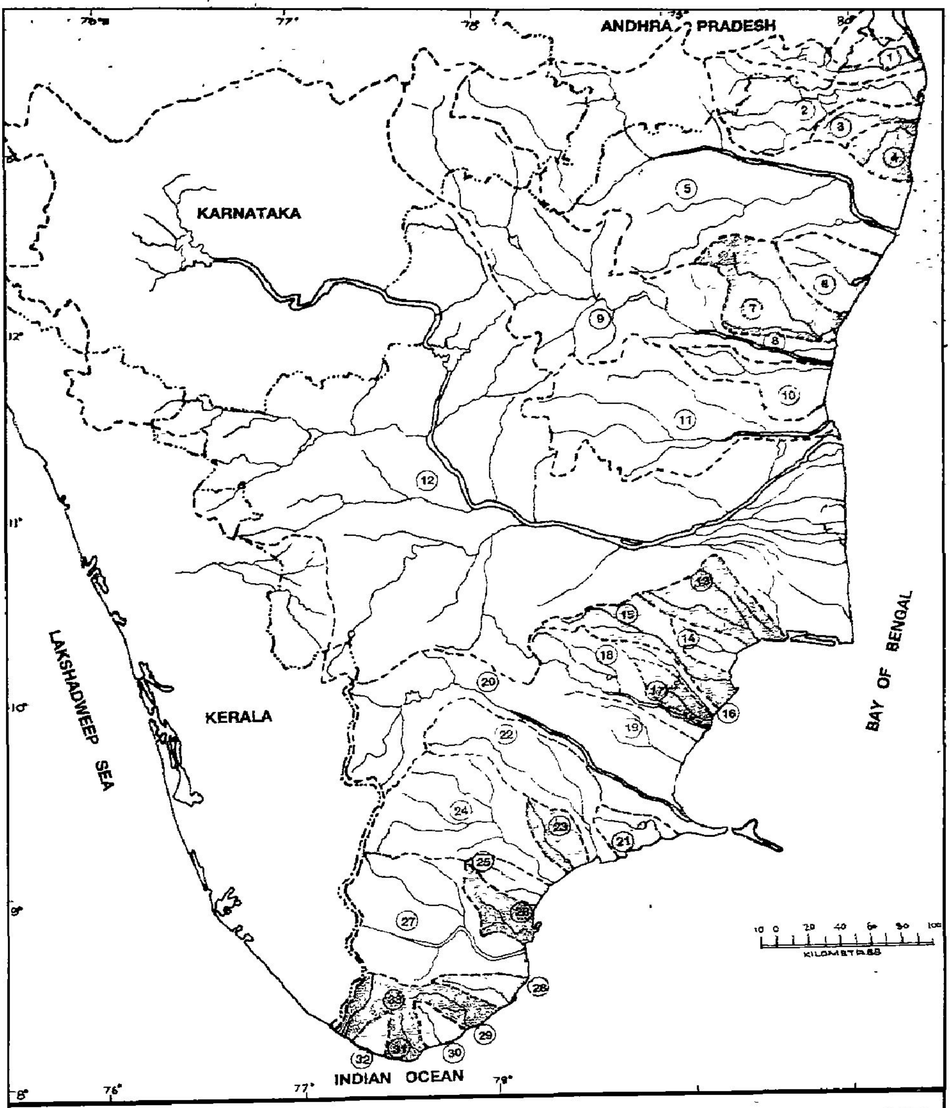
Map 2.2

Map of Tamil Nadu - Physical Features



Map 2.3

Map of Tamil Nadu - River Basins



1 ARANIYARU
2 KORTALAIYAR
3 COOUM
4 ADAYAR
5 PALAR
6 ONGUR R.
7 VARAHA NADHI
8 MALATTARU
9 PENNAIARU
10 GADILAM
11 VELLAR
12 CAUVERY
13 AGNIARU
14 AMBULIYARU
15 VELLAR
16 KOLUVANARU
17 PAMBAR
18 MANIMUTHAR
19 KOTTAKARAIARU
20 VAIGAI
21 UTTARKOSAMANGAIARU
22 GUNDAR
23 VEMBARU
24 VAIPPARU
25 KALLARU
26 KORAMPALLAMARU
27 TAMBARAPARANI
28 KARAMANAIARU
29 NAMBIYARU
30 HANUMA NADI
31 PALAVARU
32 VALLIAR
33 KODAIYAR
WF WEST FLOWIN

CHAPTER 3

IRRIGATED AGRICULTURE — IN SANGAM AGE

3.1 River Cauvery has been and is the lifeline of the state and it is in this valley that Tamil civilisation flourished. It is said that irrigated agriculture was in vogue in the Cauvery delta contemporaneously with irrigation practices in the Indus Valley and the Mesopotanean Valley of the present Iran.

The Sangam age is much earlier to the Christian era and fortunately we are left with a few works in Tamil of great literary value, which throw light on the occupation and socio economic conditions of the people of that age. Undisputably agriculture has been their mainstay and the entire civilisation grew in the agrarian background.

'Tolkappium' literally meaning a renowned grand old text, is considered to be the first work, which defined the grammatical version of the Tamil language, and in that we find that there is a direct reference to the four-fold physiographical division of land as then identified, the Kadurai-ulagam (the forests) the Maivari Ulagam (the hills) the Tirupunal Ulagam (the plains) and the Perumanal Ulagam (the littoral or sandy region). The poets and bards of this age defined these regions with a hydro-geological base and named them as Kurunji, Mullai, Marutham, Neithal and Palai and these names stay still well understood in the Tamil Nadu. 'Kurunji', the mountainous region is associated with waterfalls and springs. "Mullai" the forest or pastoral tract is associated with wild streams. The 'Marutham', the agricultural region is associated with the existence of rivers, wells, ponds and tanks and the 'Neithal' the sandy coastal tract is associated with the dug wells or sand wells mostly yielding brackish water. The 'Palai' the fifth division denoting arid desert tract is not recognised as a separate physio-graphic region but as a state of aridity with scrub vegetation which can exist in any of the other four. The only source of water in such arid conditions could be the underground springs.

'Thirukkural' is the next literary text of the age, which is a well known, valuable compendium of 1330 'two line' couplets on 133 topics with 10 couplets assigned to each topic arranged in three chapters, sung by the saint Thiruvalluvar. This text has been translated into many languages of the world. Almost all aspects of living are dealt within this text under these 133 topics. In this, immediately after the first 10 couplets dealing with the greatness of the Creator of the world, the author gives importance and allots the next 10 couplets to 'rain' and shows how rain is inevitable for the sustenance of life. Further down in the text (couplets 1031 - 1040) he discusses how the agriculture is the most exalted of the professions in the society and the backbone for the state.

Irrigated agriculture was thus practiced in this part of the country in the Sangam age and most people adopted the honourable profession of farming, producing food for the people and adding to the coffers of their kings.

3.2 Historians after long research now conclude that the so-called 'Sangam Age' can be said to have concluded some time during the middle of the third century AD. By this time the Cheras were in possession of large parts of the north-western part of the present Tamil Nadu, the Cholas were ruling the Cauvery delta and the surroundings and the Pandyas in the southern part of Tamil Nadu. Of course there were frequent wars between these to assume supremacy. All the same they also allowed parts of their own country to be ruled by their trusted chieftains. Decentralisation of power should have been a necessity in those times of poor communication.

CHAPTER 4

IRRIGATION DEVELOPMENT - BY CROWNED KINGS

4.1 The Tamil Nadu state as existed at the beginning of the Christian era was mainly ruled by the 'Crowned Kings' of **the Chera, the Chola, the Pallava and the Pandyan** lineage and a number of minor chieftains. Agriculture flourished in all these kingdoms well patronised by these kings and chieftains. The probable political boundaries as existed at that time that fall within the present Tamil Nadu State are depicted in Map 4.1. It has to be however mentioned that these boundary lines were often changing with these kings engaging in frequent feuds among themselves and annexing or ceding parts of their territory often and claiming suzerainty.

There are innumerable evidences through literary works, poems sung by bards and inscriptions in stones mostly in temple precincts, to show that all the kings and other chieftains did yeomen service to their subjects who were mainly agriculturists, creating irrigation sources for them by way of constructing small diversion weirs called anicuts across streams, forming minor irrigation tanks, ponds, urunis (small pondages mainly meant for domestic and communal use), digging community wells and so on.

4.2 By far the most important irrigation structure that was built some time in the second century AD by the King Karikala Chola is the **Grand Anicut** across river Cauvery 16 km east of the Tiruchirapalli town. This anicut is really grand as it has been named later, in that it is perhaps the oldest hydraulic structure built on permeable foundation in the world which is still functioning at the head of the Cauvery delta.

- The Grand Anicut is a marvelous piece of hydraulic structure, built across a mighty river in its sandy bed, when the science had not developed enough to build safe structures on permeable foundations, and serving to this day excellently well with a few modifications made in the nature of improvements to the structure. Judged from the recorded data, floods to an extent of about 5260 cumecs (1,86,000 cusecs) have been discharged through this anicut with minimum or no damage. It is possible that much higher floods could have flowed over in the past when there were no other structures on this river.

- No recorded information is available as to how they founded this structure nor on the manner of its construction. It is believed that large cyclopean granite stones would have been brought and dumped across the flowing stream and continuously replenished as these boulders sank in the sandy bed, by their own weight until they got well embedded in the clayey layer below. When the structure thus rose above the water level the weir should have been formed to the crest level as we see it today. It has not been possible to explore and detail the foundations accurately. Such a course has not been advised either, considering the importance of this structure to the delta irrigation. The anicut as seen consists of a core of rough stones in clay covered with facing of rough stone in mortar. A portion of the crest was built with a curved top and the rest with a series of steps, the foot of the solid dam being protected by a rough stone apron. The anicut is 329 m (1080 ft) long, 12.20 m to 18.30 m (40 ft to 60 ft) in width and 4.57 m to 5.49 m (15ft to 18 ft) high. The main function of this anicut is to retain the water in Cauvery and its branches in the Delta by raising the water level and pass on the surplus into Coleroon arm just a kilometre off to the north through the Ullar river. The whole work might have been done employing native labour with a religious zeal utilising whatever experience they had at that time in tackling river problems. King Karikala Chola is said to have inflicted crushing defeat upon the joint forces of Chera and Pandya rulers and also successfully invaded Ceylon (Sri Lanka). It is on record that thousands of slave labour brought from Ceylon (now Sri Lanka) were employed on this work, after Cholas' conquest of Ceylon (Sri Lanka) using his powerful navy.

- Shri V.R.R. Dikshitar writes, "It was indeed a singular achievement of a monarch who had the long vision of brightening the rural life of his kingdom and consequently increasing the popularity of his State. So the

King came to be known, as Karikala Peruvalathan meaning King Karikala was a man of genius. Besides constructing the embankments of Cauvery (Kaveri), he dug a number of "channels, canals, tanks and built bunds."

- Raising of embankments on either bank of the river Cauvery for long distance above the Grand Anicut is also attributed to the same King Karikala Chola who found the need for containing the large floods carried by this river during monsoon period since there was no great abstractions in those days.

  An epigraphic inscription reads

  "Karikala who curbed the pride of the subordinates, prevented the Kaveri which by the extensive floods caused the land to be deprived of its produce, by means of bunds formed of earth thrown in baskets carried on heads".

4.3 The land ruled by Cholas was mostly plains falling under the 'Marutham' category consisting of fields and culturable lands, a large part of which lay in the Cauvery basin. After stabilising the source of water to the Cauvery delta by the construction of the Grand Anicut, the successive rulers excavated canals taking off from the number of tributaries of Cauvery (there are 36 of them feeding the delta which fans out towards the sea). It can be seen that 1505 of such main Channels in the delta all of ancient origin with their own distributories, minors and so on providing the water carrier system spread out in the delta. In those years when there were no storages on the river to hold on the floods of the monsoon season for use during the cropping period, the farmers devised a system of holding water as much as possible when available by raising the field bunds.

This means that "with raised field bunds, more water could be held from which large paddy could be produced. The farmers will flourish and through that the king and the entire kingdom will flourish".

Hundreds of such diversion weirs or anicuts, were built by the ancient rulers across the streams, tributaries of major rivers for gravity irrigation. These were all founded on rock available close to the bed. If the rocky base is not available along the straight line across the stream, they traced and went along the kinks and curves as the base rock formation presented, and built weirs on them. They knew the purpose is served if they could build a structure across the river to raise the water level and carry the waters over the land through the canal they excavated. In many cases they left vents to serve as scour vents and also send low flows downstream for the existing use. The control for these sluices was through insertion of wooden sleepers between rails arranged in a row for the width of the sluice. The body wall of the anicut is made some times massive for fear of being disturbed in floods. In no case have they been made of any designed profile to obtain smooth overflow, for such a profile had not been devised in that period. But they provided adequate protection downstream to take the impact of the falling waters until the anicut gets submerged. They also generally made elaborate aprons with large size stones in steps for the falling waters to flow to the river bed downstream without causing any retrogression in the river section.

4.4 The Kodiveri Anicut is one such anicut, which (perhaps) was built by Chera Kings on the Bhavani the tributary of Cauvery which runs in curves and kinks, raising the water level by 4.2 m to feed a channel on either bank, the command area served on date being 9,915 ha.(24,500 ac). On the same Bhavani near its confluence with River Cauvery, we see an interesting massive structure called the Kalingarayan anicut presumed to have been built by the chieftain Kalingarayan perhaps in the 2nd century. This anicut is serpentine in alignment 230.7 m (757 ft) long in an angle to the flow inviting and leading the flood surplus to join the main river and at the same time raising the water level by 3.2 m to get diverted into a channel on its right. It is said locally, conveyed over generations through word of mouth, that the chieftain of the place had a dream in which he saw a large serpent swimming across Bhavani to reach the other bank and disappear into Cauvery which made him decide to build a masonry structure along the serpentine course across the river to be stable, for that was the line indicated by 'Kalinga' the serpent God. The anicut came to be hence called the 'Kalingarayan'

anicut. Another interesting feature in this scheme is the excavation of the contour channel of 105 km (65 miles) long closely tracing the ground contour for gravitational feed along the right bank of Bhavani continued on the right bank of Cauvery encompassing a ribbon like stretch of about 5,666 ha (14,000 ac). Incidentally this small bit of irrigated land is the most fertile in the Cauvery basin of Tamil Nadu, with a part registered even for a third crop.

4.5 While these ancestors could build masonry diversions on tributaries which were within their capacity to tackle, on the main Cauvery, they devised a temporary bund to be raised across the river called 'Korambu' in the local language, which served the same purpose of slightly raising the water level, when the flow is controllable, to be diverted into the channels on the banks. **Korambus** are made by driving casurina or bamboo poles in the sand in rows and stuffing in between with Nanal grass or any such vegetative mass which with sandy grit forms a sort of barrier to the flow and permits a rise of water level over a short height. These Korambus got washed away when the river rose in floods to be reformed again after the floods subside. Such Korambus are still in vogue on the river Cauvery below Mettur and above upper anicut. In fact the irrigation channels taking off at the upper anicut should have themselves been served by such Korambus before Sir Arthur Cotton designed and built it in 1836 AD.

There are 13 such channels serving narrow strips of land on either bank of Cauvery below its junction with Bhavani tributary and the present Upper Anicut, all of which are of pre-British origin. Their details are given in Annex-4.1 "Channels Built by Chola Kings". These channels have been excavated mostly by Chola Kings in various times and perhaps improved and extended subsequently by their successors over centuries.

The most notable among these channels in the engineering point of view is the Uyyakondan channel in the Tiruchirapalli district believed to have been excavated between 985 and 1013 AD by Raja Raja Chola-I, while a head sluice for the same was provided between 1070 and 1120 AD by Kulothunga Chola-III. This channel taking off from Cauvery 10 km upstream of the Upper Anicut, runs for 66 km winding and flowing placid with mild velocities traced along the contours with mild grades to command largest extent possible in this plain country with the head available over its bed at the point of take off. It is amazing how the ancestors were able to design and execute a gravity canal scheme of this magnitude at that point of time to such a precision. It continues to serve till day with probably a little of desilting here and there over the years. It passes through the Tiruchirapalli town itself and finally infalls into a minor irrigation tank at its tail called Valavandankottai Tank.

4.6 Down South, in the Vaigai and Tambaraparani basins, the Pandyans had their sway over a long period. They are held to represent one of the oldest ruling dynasties in the world. Pandyan Kings are said to have established the three Tamil Sangams, one after the other over centuries before Christ, each succeeding the other when they were destroyed with large chunks of land being devoured by the sea, through erosion and flooding. Tamil Sangams were the places where literary men of eminence met, presented their writings in prose and poetry and got them accepted before they were placed before their king. Their advice was also sought for by the king in many matters. A few literary works of that age are fortunately available, the earliest being Tolkappium, the grand old text. Purananury, Pattinappalai, Paripadal, Pathupattu, Ettuthogai, Nattrinai, Perumpanattruppadai are said to be of the sangam age. From these works of literature and from the songs of the bards we get some glimpses of the agriculture practices of that age. The land in every village was classified under Nirarambam (wet lands), Kadarambam (dry lands), Thottam (garden lands) Kadu (forests) and other wastelands. The wet lands and dry lands were also referred to as Nanjai and Punjai respectively which are still understood as such. Land and Trade were the chief sources of revenue for the king. The measures for the land were 'ma' and 'veli'. One 'ma' is approximately 0.13 ha (0.325 acres) and one 'veli' approximately 2.63 ha (6½ acres). Strangely these measures are still in use among farmers in the southern districts. The bulk of land was owned by 'Vellalar' community, the agriculturists par excellence who are said to have commanded a high social rank. Even now we see this community holding their pride place in the

southern districts of Tamil Nadu. In the society while some owned lands and cultivated by themselves, some got them tilled by others and all these were helped by those who helped agricultural operations supplying and distributing water and so on It is mentioned in **Perumpanatruppadai** that a unit of cultivation was measured by the quantity of water used for irrigation through one 'sal' a large vessel for drawing water. This method of drawing water with 'sal' and incidentally referred, to measure the quantity drawn from wells, survived even to the medieval period. This is because of the adaptability and easy applicability of this device called 'sal'. Even now the usage of 'sal' for bailing water from wells through bullock power is prevalent in many villages in Tamil Nadu Water partly through canals and channels taking off from rivers and tanks was of course measured with reference to the time of flow, flow period determining the share of the different farmers (similar to warabandi).

4.7 Vaigai being a river of unpredictable supplies, hundreds of tanks, now existing in Madurai and Ramanathapuram districts seem to have been in existence even in Pandyan Rule and probably mostly created by the kings and chieftains in stages These tanks depend on their own catchments some of them getting supplementary source from the river.

"Madurai Kanci" a literary work, which gives a graphic description of the Pandyan country during the reign of Pandyan Nedunchezian also refers to a few types of water lifting devices, employed in tank irrigation. A passage when translated will read as "In thy domain is heard the sound of those who stand in rows and irrigate their fields from tanks with basket pails to well-sweep tied and baskets strongly made and softly bound" Pandyan Nedunchezian is depicted as a very powerful ruler in his period having defeated the Chola and Chera Kings who wanted to invade Madurai.

4.8 The Sangam classic 'Paripadal' contains a poem on river Vaigai (Poem 20) describing the way in which the fresh and flooding waters of the river within the Madurai fort swelled up to the height of the walls around the city and poured down the fort walls through openings looking like the pouring of waters mixed with blooming flowers as if in worship, by huge male elephants through their raised trunks From the passages in 'Paripadal' we are to conclude that the river Vaigai was looked upon as a mighty river susceptible to frequent floods and to control and regulate it several water-heads and sluices were constructed. Pandyan records from the eighth century onwards give glimpses of a good number of sluices and river channels created in and around Madurai for irrigation development.

There is mythological story on the sudden floods carried by Vaigai, which depicts that Lord Shiva himself as having come down on earth to save people from floods. The story is still believed and narrated. When the river once rose fast menacingly, the Pandyan King sent out his proclamation directing each household to send one able bodied man with implements for voluntary labour to strengthen the flood banks.

An old poor Widow whose livelihood was dependent upon selling 'Puttu' (a rice preparation stuffed in cylindrical shape with coconut etc.) prayed Lord Shiva to help her in her predicament being unable to obey the orders of the ruler Lord Shiva appeared as a labourer, agreed to help her, demanded wages in kind, in advance, ate 'Puttu' stomach full, went to the site allotted to the old woman and instead of doing any work went into deep slumber under a tree. The message of the breach of contract reached the King who rushed to the spot to verify and punished the sleeping labourer by striking on his back three lashes. The same moment all the inhabitants of the town including the King had the pain of lashing on the back with the markings thereon. The labourer disappeared, the floods subsided and all rushed to the Shiva temple led by the puttu seller to thank him for saving the City. This mythological story besides eulogising God's Leelas tells us on the sharing of voluntary labour, the King's direct involvement in people's concern and the insistence on the sanctity of contracts accepted in those days.

4.9 River Tambaraparani having a good water potential being served both by the South-West and north east monsoons should have attracted the attention of the Pandyan rulers for utilising its almost perennial flows

for irrigation through diversion works. It is possible that the head reaches of this river system in the folds of the Western ghats could have been ruled by Cheras and some of the anicuts may be attributed to their skill particularly in the hilly regions. It is well known that there were constant feuds among the Cheras, the Cholas and the Pandyans. From an evidence through stone inscription it is gathered that the Cheras in Ambasamudram area in the upper catchment of Tambaraparani were under Chola suzerainty in the 12th century and a Chera King who built the temple in Mannarkovil during the period was obliged to name it as Rajendra Vinnagar after the Chola King Rajendra.

The first anicut on the Tambaraparani river called the **Kodimelazhagan** anicut is just below Papanasam falls. About 6 km below is the **Nathi Unni anicut** at skew to the flow tracing the stable rock below and consists of rows of large size stones of even 3.3 m x 1.2 m x 1.2 m (10 ft x 4 ft x 4 ft.) indicating its ancient origin. About 3 km downstream is the **Kanadian anicut** well built with large rough stone apron. This spans across the river connecting a rocky island in the midstream. **Kodagan anicut** about 10 km further down is again built skew to the flow. 12 km below is the Pazhavoor anicut and another 3 km down is the Suthamally anicut. 3 km downstream of Suthamally anicut is **Marudur anicut** 1,228 m (4,028 ft) in length built in a horse shoe shape with varying sections. It is clear that all these seven anicuts are pre-British in origin and most of them possess signs of having been repaired, strengthened and rebuilt in sections over a period of time, retaining parts of ancient rough stone curve structures, first built by Pandyans and perhaps also by Cheras and Cholas and their chieftains under their suzerainty.

4.10 Cheras were essentially ruling over the mountaneous regions on the west and their system of government was more decentralised as can be expected. Kings of the Cheran dynasty are supposed to have ruled in these areas now and then extending their territory even towards the present Periyar district and Thiruchirapalli district, pushing through the territory of Cholas. They existed even in the 2nd century. They are known to have encouraged poets, laureates and scholars. King Cheran Senguttavan was a great Warrior. His brother Elangovavadigal wrote the great Tamil text "Silappadhikaram" some time prior to 2nd Century AD. This text which is classified as one of the five great works in Tamil is the story of Kannagi, the woman of great virtue, who challenged the Pandyan King at Madurai for having given a wrong judgement and executed her husband, cursed the city of Madurai to be consumed by fire, ran away to the west to disappear in the hills of the Cheran territory. A temple with her statue still exists in Kerala and is worshipped by people of Tamil Nadu. Some of the Chieftains who ruled parts of Cheran territory built few anicuts channel in Noyyil and Amaravathy valleys feeding their channels. One such chieftain by name Thagadur Adhigaman ruled over parts of the territory falling under the present Salem and Dharmapuri districts. He is said to have introduced a certain variety of cane sugar cultivation. His virtues have been eulogized by Avvayar, the Tamil poetess. Perhaps his period can be placed around the third century AD.

'Pazaiyaru' is a river flowing south in the Kanyakumari district, on the banks of which is situated the Nagarkoil town, which is the headquarters of the district. There is an anicut on this river in the head reaches called 'Talai Anai' or 'Pandyan Anai' from which diversion for irrigation was in vogue for several centuries through Anandanar channel and Nanjilnadu Puthanar channel. The Kodhayar River system which was mainly in the dominion of the Travancore State came to be part of the Tamil Nadu State with the transfer of the Kanyakumari district through the reorganisation of States in 1956. Kodhayar basin is rich in water potential being served by both the south west and north east monsoons and the cropping intensity is high. All the same, certain irrigation works by way of diversion anicuts, which were carried out by the ancient Chera Kings and later by the erstwhile Maharajas of Travancore are still in use.

4.11 Among the irrigation structures built in ancient Tamil Nadu other than the river diversion works and the canals excavated therefrom are the tens of thousands of minor irrigation tanks created by the then rulers of Chera, Chola, Pandyan origin and their chieftains who ruled either independently or under the suzerainty.

Substantial contribution has been made in this by the Pallavas who ruled in territories north of the Chola, Chera, Pandyans and the Naik Kings who succeeded them. Pallava dynasty is said to have been founded in 550 AD by King Simhavarma. They propagated extensive tank irrigation. King Mahendravarman, Parameswaravarman, Nandivarman, Dantivarman have gone down in history as having created large tanks which go by their name and are still functioning. The Kaveripauk tank with a 6.4 km long bund fed by the Palar anicut system is believed to have been created in the 9th century by Nandivarman-III.

4.12 The Naik Kings came much later with the Vijayanagar Kingdom established by King Harihara in 1336 AD. Bukka-I who ruled after him between 1355 and 1377 AD is credited to have been a great propagator of irrigation to boost agriculture. From an inscription belonging to his period we find six criteria having been examined before a tank scheme was launched

(i) Possible seepage losses from the tank,
(ii) Presence of salinity in the soil,
(iii) Availability of ground water,
(iv) Availability of potential source to feed the tank,
(v) Correct assessment of the capacity &
(vi) Location sufficiently inland from the border so that it may not be a vulnerable target for the enemy.

This explains the extent to which our ancient rulers could analyse various factors before they launched minor irrigation schemes.

4.13 The famous King **Shri Krishna Devaraya** and his descendants who ruled good part of this region for quite some time in the sixteenth and seventeenth centuries has made large scale improvements to the Thanjavur delta while creating minor irrigation tanks to bring dry areas under irrigation.

4.14 Most of the 39,200 tanks, we profess to have now supporting minor irrigation, were those created over centuries spanning the christian era before the British occupation. Very few have been added in the British period and since independence. The lay out, the structure and the construction of these small tank systems speak volumes of the ingenuity of our forefathers who have adopted a style quite fitting and appropriate to this region south of the deccan plateau gently sloping towards south and east, influenced by the north east monsoon which brings in sporadic rains with long dry spells in between. The mild gradient of the country does not offer many sites for building large storages. Yet the north east monsoon rain is to be harvested and held on to save the crops on ground, growing with the rain, and they are to be administered at the village level, since centralised administration of such irrigation facilities was not the one that could be thought of in those ages of petty rulers and chieftains. We have no account of the great men who created each of these wonderful irrigation assets spread all over the region. Some light is thrown by stone inscriptions, ballads, literature and the like.The details of "Ancient Irrigation Tanks" is given in the Annex-4.2.

It is however clear that this massive effort spread in hundreds of places should have been possible only through the initiative and participation of the local beneficiaries. The chieftains and well wishers could have at best guided them. This activity is seen to have received a spurt now and then during the reigns of some of the Kings of Cheras, Cholas, Pandyans and Pallava dynasties who took keen interest in the development of agriculture for the welfare of their people.

One can see a dense spread of these tanks most of them in chain in the coastal plains of Tamil Nadu barring the Cauvery delta. A low earthen bund thrown across the natural shallow valley creates the tank which holds the run off from its catchment above until the tank is full and the surplus overflowing over a simple spill structure is led into the tank immediately below in the falling contour and this is repeated one below the other

in a chain until perhaps the last tank spills into a drain or a river. These tanks are also so closely laid out that the water spread of one tank almost hugs the ayacut commanded by the tank above, with the result we can see a continuous stretch of irrigated land with the numerous tanks inter spaced.

These irrigation tanks formed taking advantage of the existence of low depressions and valleys have to be per force of varying capacities benefiting to the extent of as low as 20 ha and even below and as high as 5,000 ha and above in some rare cases. The benefits of such tanks naturally extend beyond a village and this necessitates their management by a cooperative effort not only among the beneficiaries in a village but also between benefitting villages.

Most of these tanks have survived to this day and are still in use, may be with reduced benefits. District wise list of tanks in Tamil Nadu as of now categorised on the extent of the commands served is given in the Annex-4.3.

In whatsoever manner these tanks came into existence, the control, operation and maintenance has always been with the farmers. Being small systems we have almost one tank for each village and so the villagers have a sense of ownership in them and have been taking the responsibility of taking care of them. There are cases of even more than one tank serving the lands in one revenue village one big one called the main tank and one subsidiary called the 'thangal' which mostly receives the return flows from the irrigated areas and this serves as reuse resource. There are also many cases in respect of big tanks where the ayacut area lay in more than one village. An understanding has been developed on the sharing of the waters and the responsibilities between the villages and we see them operative even now.

Structurally the tank system consists of the long earthen bund with a spill structure on either or both ends, one sluice in the deep bed and a few other sluices at different levels of command, the lands on either side of the shallow valley. Each of the sluices is earmarked to serve a block of lands and thus the localization of the ayacut has been done long back. Naturally while the lands under the deep sluices have the prospect of being served for a longer period, the lands coming under the high level sluices may be served for a lesser period and they get classified under lower category (taram) in respect of dependability of the water source. In the command the main irrigation channels from the sluices are aligned in contours and some times throw out minors and sub minors. Water courses and field bothies/channels run to feed the individual holdings.

As the storage builds up with the on coming of rains, the village headman or the leader of the irrigation group formally or informally functioning in the village decides on the date of the opening of the sluice for commencing the cropping for the season. In case more than one village is involved, the leaders in all the villages are consulted. One this decision is made the Neerkatti (common irrigator) or Neerkattis take over and get busy in the distribution of the waters to the land holdings following a prescribed turn either by days or hours. The Neerkatti is paid in kind during the harvest time. A lot of mutual adjustments in the distribution may be made depending upon the need, the preparedness of the particular farmer to use waters and so on. Cases of mal-practices or disputes if any are brought to the notice of the village headman who either by himself or by convening the meeting of irrigation group members decides the issues. The villagers watch the building up of the storage through the monsoon period and draw minimum requirements. With the end of the monsoon strategies as to how to utilise the storages left are discussed and decided and if after satisfying the crop on ground still some waters are left over, irrigation is given for a summer crop for part of the command, the extent being decided on, depending on the quantities left. Since waters are drawn through sluices as the rain continues, the total utilisation will exceed the total capacity of the tank and it is counted as two to two and half times. This is the general practice still in vogue in most parts of the state with regard to control and operation of these tanks.

4.15 With regard to the maintenance of the system, the maintenance of the channel system below the tank has always been with the village group. They have traditional procedure of subscribing labour or cost equivalent

of labour by each holding to keep the main irrigation channel system trim and in good repairs to draw the flows satisfactorily. Of course trimming and maintenance of the water courses and field bothies are done by the beneficiaries locally.

There are many evidences by way of inscriptions or palm leaf documents left over to the effect that the maintenance of these tanks has been a great concern of the erstwhile rulers. A number of records register endowments favouring the tanks to be used for maintenance.

a) An inscription in **Gudimallam** tank attributes to Pallava King Dantivikrama Varman, registers a gift of land the proceeds from which is to be used for desilting.

b) Pallava King Kampavarman donated specified quantity of paddy to the **Ukkal tank**. Later during the reign of the Chola King Rajendra Chola-I, the village assembly was authorised to sell some land, the income from which is to be utilised for the upkeep of the two boats assigned to the tank for desilting.

c) Maintenance of tanks was considered a meritorious act. A passage in the inscription of 1413 AD reads "A ruined family, a breached tank or pond, a fallen kingdom, whosoever restores or repairs a damaged temple acquires merit fourfold of that which accrued for them at first".

d) Certain levy was made on the farmers to meet the cost of maintenance. This went by the name 'ERI Ayam' or 'Eri Eevu'. One of the inscriptions attributed to Pallava ruler Dantivikrama Varman (early 9th century) ruling at Kanchipuram states that if a certain farmer failed to pay the dues on his holding, the village assembly paid on his behalf, but his lands will be taken over for the benefit of the tank for three years. To get back his lands he has to pay all his dues. In case he is unable to pay and take back the lands, they will be sold for the benefit of the tank. If he objects, the village assembly will treat him as an outsider and his living there made impossible.

e) The right of fishing was leased to bidders and the income was spent on the maintenance.

In the village community the irrigation tank and the temple in the village received equal importance and many times the interest in one subscribed to the better upkeep of the other. Donation of land for the maintenance of temples has been a tradition for centuries that continues to this day and the village assembly gets interested in the agricultural development from such donated land.

The best model could be the one relating to the shrine of **Sri Venkateswara** or **Balaji** in Thirumala a pilgrimage of repute in the whole country. More than 1000 inscriptions from this temple throw an inspiring light on several aspects of social life during the period from ninth through the sixteenth centuries. These mainly deal with the endowments of land and money and are therefor most useful for the analysis of the nature and utilisation of such religious endowments. In the 16th century under the patronage of the Saluva family under the Vijanagara State especially Saluva Narasimha, and his successors, the temple received rich endowments of villages. Between 1509 and 1568, 115 villages were granted for specified ritual services. Several irrigation development programmes were undertaken in the Tirupathi Chandragiri area to increase the agricultural produce from these villages. An inscription of February 10, 1542 says, "Since you paid the sum of 15,000 panams (a measure of money of those days) for the purpose of propitiating Sri Malai Kuniya ninraperumal with 300 appa-padi as yearly offering, we shall utilise this sum of 15, 000 panam for the improvement of tanks and channels in the temple villages and with the income obtained thereby, the above mentioned 300 appa padi shall be prepared and offered".

Prof. K. A. Neelakanta Sastri a reputed historian, in his book on Chola period records that (a) village sabhas did desilting before rains if necessary by creating special maintenance funds (b) water rights went with land when land was sold or gifted (c) villages were collectively fined when they did not do desilting and (d) several stone inscriptions talk of strengthening tank bunds, closure of breaches in tanks and community efforts to give irrigation facility to lands belonging to temples.

4.16 It would be interesting to learn of the historic evolution of the rules and regulations in the operation of these minor irrigation tanks, which have now come to stay as a part of tradition still honoured in many areas of the states.

The rules and regulations which were in force since the days of Pallavas were primarily framed to regulate uninterrupted supply of water to all sections of the state in the interest of doing justice to all and also to prevent wanton damage to irrigation works. These rules and regulations, which were in the nature of royal order were scrupulously followed by the local governing bodies and the village assemblies. Evidences can be quoted.

From the Kasakudi plates of Nandivarman Pallavamalla-II we find that the King, after granting the donees permission to dig river channel and inundation canal from Cheyyaru to feed the Thenneri tank near Kanchipuram, strictly laid down

> "who take water and use water in these channels by pouring out baskets by cutting out branch channels or by employing small levers shall pay a fine to be taken by the King".

This is an instance of punishment envisaged for unauthorized drawal of water. During the rule of the Cholas these rules were further modified and well defined and strictly enforced. An interesting inscription of Parakesarivarman Uttamachola found at Konerirajapuram details the condition of the grant as:

"These lands (shall enjoy the privilege of) being irrigated by channels dug out (as per rules) for the distribution of water, others shall not cut or dig out diversions from these channels, nor put up small piccottahs, nor bale water by baskets, nor obstruct (the flow) with cross banks. The water (thus made) available must not be wasted; the water must be economically used'. "Canals flowing across other villages to irrigate the land of this village and vice versa shall not be permitted to over -flow over the boundary line and to cast-up slit. Besides, the embankments of tanks shall be allowed to be raised within their limits so that they may hold the maximum quantity of water".

The conditions laid down by Rajaraja Chola-I for the enjoyment of the grant by the donees are recorded as below :

(1) When fresh channels have to be dug, they shall be done so as to admit of an easy flow of water. With their aid, the lands of the village shall be irrigated. After the fields are irrigated, the waste or the excess shall be collected and led away.

(2) Water passing in the existing channels for irrigating the lands of this village shall be allowed to do so as usual and the excess water shall, consistently with prevailing custom, be collected.

(3) Good water intended for drinking shall not be used for common purposes, but that water may be dammed and made to irrigate lands. This clause prevents the contamination or pollution of the sources of water intended for drinking purposes.

(4) Large wells shall be sunk.

Another message seen from the **Tiruvalangadu** plates of Rajendradeva-I detailing the privileges and conditions of the water deserves mention here.

> "The lands of this village shall be irrigated by canals dug (proportionally) as per water assigned (from these canals); others (who are not tenants of the devadana lands) shall not be permitted to cut branches from these canals (Kurangaru), dam (the passage of water) across, put up small piccotahs, or bale (out) water in baskets. The water (thus) assigned shall not be wasted. Such water shall be (appropriately) used for irrigation (after) being regulated. Channels

and springs passing across the lands of other villages to irrigate (the lands of) this village shall (be permitted to) flow over the boundary line and cast up (silt); channels and springs passing across the lands of this village to irrigate (the lands of) outside villages, shall also be permitted to flow over and cast up (silt)".

All the same, water feuds did arise now and then when there was illegal turn of water supply to a particular field or a village. To carry water through a canal via a particular village without getting necessary permission was strongly objected to. Mostly those feuds were sorted out in the village assemblies or were brought before the local governing bodies. The decision was accepted and in some cases, when fines were imposed, the receipts went to the temple. Some times higher authorities had to intervene when local bodies fail to settle the issue. One such interesting case may be quoted. "In AD 1406, a dispute arose between the villagers of a hamlet of Uttaramerur and Attiparru, a nearby village regarding the supply of water from the local tank. The dispute was settled amicably among the feuding villages in the presence of Mahapradani Arasar".

A royal charter of Rajaraja-I speaks of the peaceful methods adopted by the state to secure peace and harmony among the people of the adjacent villages and to safeguard their rights.

Two clauses specifically mentioned read :

(i) the irrigation channels passing through the lands of this village to other villages in the outskirts shall be permitted to flow without any impediment of the donee"; and similarly also

(ii) the channels passing through outside villages to irrigate the lands of this village shall be allowed to flow uninterrupted by the people of the out-lying villages".

4.17 Interesting information on the irrigation practices in the Chola, Pandya and Pallava periods as seen from the inscriptions, deciphered, culled out and presented by **Mr. R. Tirumalai** in **his "Studies in the History of 'Ancient Townships of Pudukkottai** and published by the State Department of Archaeology are briefly listed below:

a) The inscriptions related to the period around 1400 AD.

b) The region of study extended over the present Pudukkottai district which was mainly the erstwhile native Pudukkottai State lying between the Cauvery and Vaigai basins.

c) Reclamation of forest and waste lands was undertaken to offer lands by grant especially to Brahmins which part went by the name 'Brahmadeya' and to temples and religious institutes which went by the name Devadana.

d) Whenever people were affected by floods or droughts, the land dues were suitably regulated and remission was also offered.

e) Urar/Sabhayar meaning the elders who formed the village council controlled all operations relating to irrigation sources, maintenance of systems and also water distribution.

f) Whenever tank breaches that occurred were too big to be tackled by the Urars, the King was requested to undertake the repairs and one such instance is quoted as having occurred during the rule of Maravarma

g) Instances of grants having been given for the maintenance of a desilting of tanks are reported during the rule of Raja Chola I (AD 1013) and Kulothunga Chola-III (1202).

h) Whenever the maintenance cost went high the Urar by consensus even sold lands to meet the cost.

i) At the same time Urar zealously safeguarded the public utilities including tank systems and penalty was levied for any damages or destructions.

j) Proceeds from annual auctioning of the fisheries in the tanks were ploughed back for the maintenance of the tank by the Urar.

k) Keeping channels and water distribution systems in trim condition is the customary obligation which was insisted on through compulsory customary labour contribution.

l) The tank has normally more than one sluice, the one which was with the lowest sill usually being larger was called the 'Perumadai' the others being said to be 'Sirumadais' small sluices. The surplus was generally termed as Kadaimadai.

m) In some situations the distribution channels were so laid out with inter linking so that certain lands could be served by more than one channel. Otherwise it was clearly specified as to which land is to be served by which channels.

n) Water use was regulated through hours of drawal which was decided on the basis of the extent, the level of the lands to be served , the soil conditions and the crops grown. The lands were also served by turns (murai) and the 'Naaligai' a measure of time (2.5 naaligais make one hours) was specified for each such turn. The concept of 'Nir Naaligai' which can be said to be equivalent to 'cusec' was already there.

o) Disputes were settled by an agreement between parties and when rights of more than one village were involved, the share of water from the tank was settled by constructing diversion weirs. In some cases, dispute got settled by ordering 'fire ordeal' in the local temple.

p) Rates of land dues levied were specified for wet and dry crops and for different modes of irrigation.

q) Wells were dug extensively and in many cases wells were held in share. Farmers using well waters were also asked to pay tax.

4.18 A word about the mechanical contrivances used for lift irrigation in the medieval times may not be out of place here. It would be difficult to trace their evolution. However it can be said that the simple basket to the water wheel (Persian wheel) had no doubt been used side by side and remain in practice upto the present day. References to such use of contrivances are seen not only in Vedas but also in the Tamil literature like Ahananuru, Maduraikanchi, Silappadikaram, Manimekalai and Periyapuranam. A stanza written by the celebrated Tamil Poet Kambar in his literary work. 'Erelupadu' translated will read as :

> "Let not rain fall; Let the seas and the
> rivers dry up; Let there be famine every
> where ; Let not each do his respective duty,
> in the world; Even if all these adverse
> circumstances happen at the same time, only
> if the peasants do their duty, water their
> crops from wells by means of "ettam", the
> crops will grow and there will be no hunger
> in the land".

The basket, the leather bag or bucket moved by pulley wheels to draw water through animal power are very common simple devices still in use in almost all the parts of the state. They can give only intermittent or discontinuous water supply but good enough to feed an extent of 2 to 3 hectares under a well.

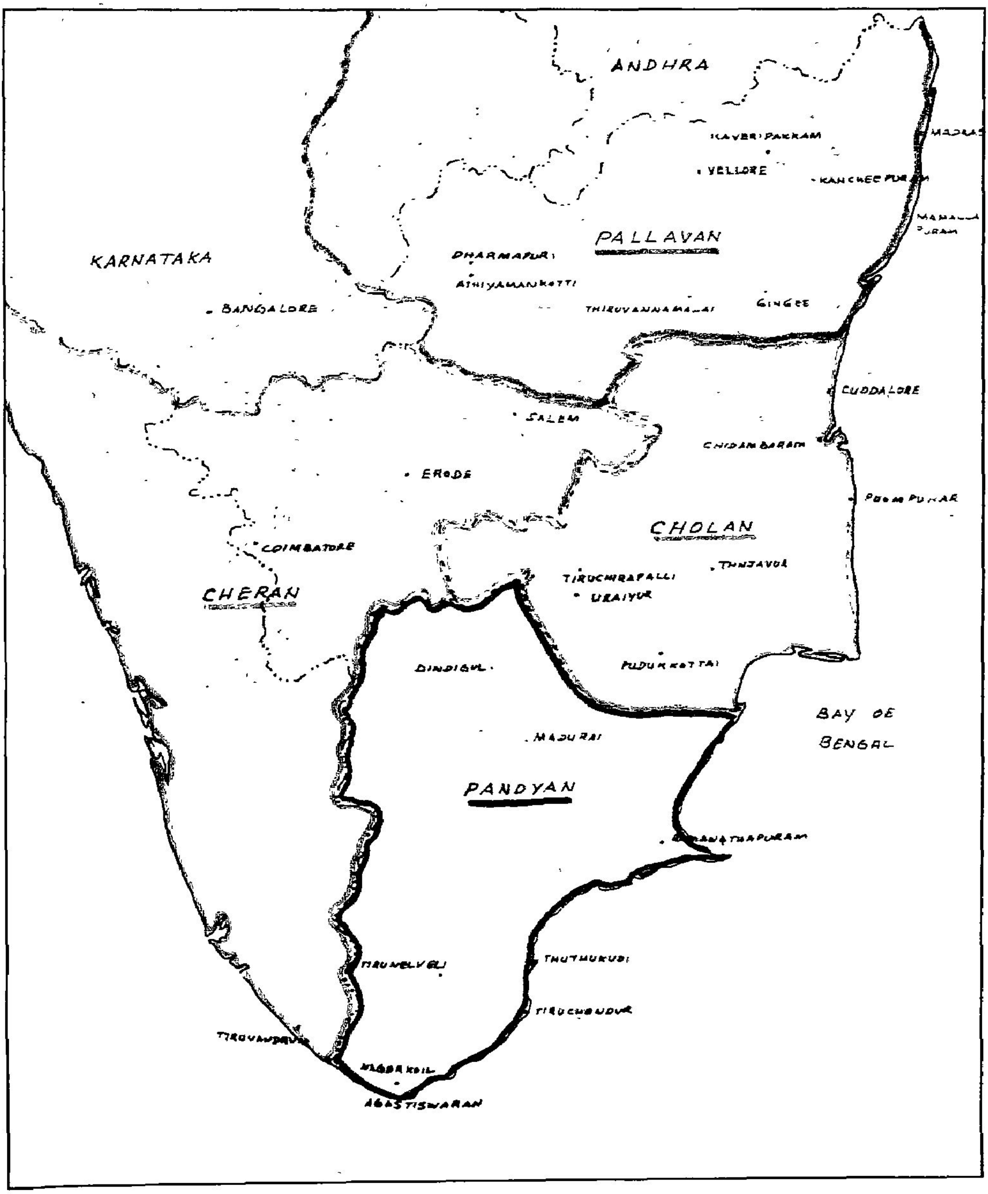
The "Ettam" (Picotah) a semi mechanical device is another simple device seen to have been in use right from the Vedic period. This is also seen in all parts of Tamil Nadu where small lifts from the water source are needed to feed the command.

The water wheel, which is also now termed as the Persian wheel should have also improved over time and is also seen in use in many parts even to this day. They of course provide continuous water supply to the field channel. There are reasons to infer that this is also an indigeneous device in use long before the Muslim invasion, which acquired this name perhaps after some improvements.

All these devices for lifting water for irrigation have survived to this day because they are simple, economical and effective. The advent of electrical power has now revolutionized lift irrigation and we go in for large scale pumping of ground water from even deep sources to high level lands extensively.

Map 4.1

Map of Tamil Nadu - During the periods of Cheras, Cholas, Pandyas & Pallavas



CHAPTER 5

IRRIGATION DEVELOPMENT - IN BRITISH RULE

5.1 Soon after the British had succeeded in acquiring large territories through their military action and various other means of gaining supremacy, they started consolidating their holdings and turned attention on administrative measures to aid civilian rule. The Madras Presidency was carved out as was the Bombay Presidency and others and it encompassed the whole of the present Tamil Nadu, parts of the Andhra Pradesh, Orissa, Karnataka, Kerala barring the native States like the Nizam of Hyderabad, the Mysore, the Travancore, Cochin, Pudukkottai and many other smaller units that existed in the southern region.

5.2 Even before India went under the colonial rule of the British, while the East India Company continued to administer the territories in their command, they realised that the restoration and improvements to the existing irrigation works should get the first priority in the civilian rule to keep the farming community in good humour and assist in maintaining food production, incidentally improving their revenue.

The Engineering Department of the Military Board manned by Royal Engineers looked after the garrisons. all fortifications and cantonments while the Board of Revenue had a department called the 'Maramath Department' to look after the irrigation works, navigation canals, all civil buildings, minor roads etc. Initially the Collectors in the districts assumed charge of the public works, irrigation structures with some professional assistance and this did not function effectively.

As early as 1809, engineers under designation of "Superintendents of Tank repairs" were appointed and asked to aid the Collectors. This shows that the minor irrigation tanks occupied prime place among the public works at the time. By 1825, the post of "The Inspector General of Civil Estimates" was created to function in the headquarters under the Board of Revenue and supervise the work of the 'Superintendents of tank Repairs' in the districts.

On the recommendations of the Public Works Commission constituted by the Court of Directors of the East India Company in England, approved by the Home Government and the Government of India, the Madras Public Works Department was first formed in 1858 headed by a Chief Engineer A galaxy of British Engineers most of them with the Military Engineering training with the ranking as RE occupied the post of the Chief Engineer, the notable among them who contributed immensely for the development of irrigation in the state can be cited as :

Col. Sir Arthur Cotton KC IRE	1853 - 1858
Lt. Col. J. Penny Cuick CS IRE	1886 - 1887
C.A. Smith, CIE	1906 - 1913
Col. W.M. Ellis CIER	1914 - 1917
W.J. Howley	1917 - 1921
Col. A. H. Moris	1921 - 1923
C.I. Mullings	1925 - 1928
R.F. Stoney	1926 - 1931
Mr. Mcintosh	1932 - 1947

5.3 The agrarian scenario in this part of the country as in others has been far from satisfactory at the beginning of the 18th century. The irrigation assets created in the medieval times had badly deteriorated due to long neglect under the later rulers who were more intent on safeguarding their throne from the onslaughts of their enemies than plan for the development and the welfare of their subjects. People were left to the mercies of the rain God and the food production was low and precarious. There were frequent occurrence of droughts

and famines. Major famines in the Madras Presidency are reported to have occurred in 1709-1711, 1728, 1731-1734, 1737, 1782 and 1792. People were badly impoverished and the village structure, which was mostly self-sufficient was broken down. The British Engineers had therefore set their first task on repairs and restoration of old indigenous irrigation works already in place for better utilisation than think of any new irrigation projects. They were themselves no experienced irrigation engineers for there was hardly any irrigation in their country. Still they realised that for the stability of their own colonial rule and to ensure peaceful countryside where agriculture is the mainstay, they must turn their attention to irrigation development. But for every scheme they proposed they had to show corresponding revenue in terms of land tax and it was no easy task to satisfy the administrators.

5.4 Irrigation development as they could conceive and implement centered on:

(i) Repairs and restoration of the minor irrigation tanks, through closing the breaches in the bunds and strengthening, repairing or replacing the sluices and providing adequate spillage structures. These works brought cheer to the farmers who in any case were prepared to take charge of the management of these storages, improve the distribution channels and use the water following their traditional methods of sharing.

(ii) Desilting and improving the several channels taking off direct from the river systems in the state, to enable them to draw the waters as and when the river flows occur during the monsoon, and carry the same to either feed the ayacut direct or feed the minor irrigation tanks lying in chain enroute, in whatever way the existing system was designed. Providing control structures was also done wherever feasible and found necessary.

(iii) Providing weirs or anicuts across the streams and rivers to ensure better withdrawal through the channels taking off, with adequate command to maintain the designed full supply depths in the channels. In most cases temporary bunds and korumboos made and maintained by the local beneficiaries were replaced by masonry structures with the necessary scouring sluices, head sluices and the apron below the overflowing weirs.

(iv) Major improvements to the Grand Anicut complex on Cauvery and the development of the Cauvery Delta System feeding the large delta once proclaimed as the 'Granary of the South'.

5.5 The contribution made by the most illustrious irrigation engineer of the times, Sir Arthur Cotton, has been immense. Ever since he entered service in 1822 as an Assistant to the 'Superintendent of Tank Repairs' he plunged himself heart and soul for the continued development of irrigation benefits to this part of the country. The one ambition he had closest to his heart was to create large reservoirs, dig up a net-work of canals all over on the Indian continent and make them all irrigation cum navigation canals so that the farmers could be offered cheap mode of water transport for marketing their produce. Godavari river was to be the scene of his most toilsome labour and his grandest success was in the planning and construction of the Dowleshwaram anicut across this majestic river in record time during 1847 to 1852 and transform the delta into a prosperous tract with numerous canals and distributaries navigable as well. He drew great appreciation from the Governor in Council and the Court of Directors of the East India Company in England. More than that he has left behind a name and fame and is being remembered with great reverence and deified by the local populace to this day. His handling of the Cauvery irrigation was superb. The Coleroon arm was scouring itself deeper and the Cauvery was getting silted up. The silting not only interfered with the passage of low flows but also reduced the carrying capacity of the Cauvery arm with the result that flood levels rose high frequently breaching the low flood banks and inundating and silting the tract.

Sir Arthur Cotton realised that the first responsibility was to ensure adequate flows to the delta and rightly decided to tackle the problem right at the head of the delta where the first split of the Cauvery river occurs. He planned and constructed the Upper Anicut across the Coleroon arm in 1836-38. It was a plain anicut with a

body wall and the necessary aprons. Incidentally this was the first large work executed by the British in Tiruchirapalli after they took over the region from the Maratha rule in 1800.

Col. Baird Smith wrote of his works during this period as those executed with originality and courage, loyalty and conviction. "The permanent prosperity of Tanjore is without doubt to be attributed in large measure to that first bold step taken by Sir Cotton in the construction of the Upper Coleroon dam under the circumstances of great difficulty with restricted means against much opposition and with heavy personal responsibilities".

A few years later the anicut was improved introducing scour vents to pass the silt along with flood flows to reduce the silting effect on Cauvery. The anicut as improved was in two branches, the north branch having twelve spans varying from 10.21 m to 10.74 m (33.5 to 35.25 ft) and the south branch with fifty seven spans varying from 9.15 to 10.36 m (30 to 34 ft). In the north branch there were eight under sluices each 1.83 m (6 ft) wide and 2.44 m (8ft) high with screw gearing shutters. There were seventeen under sluices on the south branch of about the same size. The crest of the north branch anicut was 1.58 m (5.19 ft) above the level of the zero gauge in the Cauvery arm.

The Construction of Upper Anicut had the effect of diverting into the Cauvery a good deal of flow, which would otherwise have been wasted into Coleroon. But the arrangement did not permit any regulation of water between Coleroon and Cauvery.

As the Aganda Cauvery carries large quantities of sand, the result of construction of solid anicut across Coleroon was that the Cauvery with its open head took a far larger portion of this heavy sand in high floods. To remedy the situation, the anicut was remodelled in 1902 under the proposals of Colonel Smart. The crest was cut down and remade to a uniform level of 0.61 m (2 ft) above the zero of Cauvery arm gauge. The anicut after remodelling consists of 55 bays of 12.20 m (40 ft) span each, the shutters being 1 83 m (6 ft) high. Besides other advantages, the alterations carried out permitted water to flow in Cauvery arm upto a gauge of 2.44 m(8 ft) before any water is surplused into Coleroon. This structure is safe to this day and serving its purpose.

After the construction of Upper Anicut, it was found that there was a tendency for the Cauvery bed to scour itself with an undue amount of water flowing down during floods. This often resulted in heavy floods being realised at Grand Anicut. To obviate this difficulty, in 1845, the **Cauvery Dam** was built across Cauvery at the head of Srirangam island roughly in line with the Upper Anicut on Coleroon. It consists of flooring of 0.91 m (3 ft.) thick, the upper part of which consists of cut stones. The floor rests on a double row of wells 1.37 m (4½ ft.) external diameter and 1.83 m (6 ft) deep filled with concrete. The upstream and downstream aprons are of rough stones and 2.74 m (9 ft) and 6.4 m (2 ft.) width respectively. This construction was successful in effecting a satisfactory and smooth division of flow.

Sir Arthur Cotton next turned his attention to the **Grand Anicut** structure itself. The silting upstream was heavy affecting the flow into the Cauvery and Vennar rivers feeding the delta. He decided that a few scouring sluices introduced in the anicut structure would relieve this problem and carry the silt into the Coleroon arm through the Ullar. He launched this work in 1839. It was here that he learnt his first lesson of building structures on sandy beds. While opening out the foundations for the scouring sluices on the right end he was inquisitive to see as to how the Grand Anicut which was already in position for over sixteen centuries would have been founded. To his dismay he found that the foundation base was nothing but a mat of cyclopean stones embedded in the native clay perhaps by their shear gravitational weight and stood unmoved and unshaken in fast grip. He is reported to have ordered quick closing of the foundations with concreting for the new addition, lest the foundation of the old structure may get disturbed. He has also recorded later that this experience of his had given him confidence to tackle the foundation for the new anicuts he had made on the same Cauvery and then River Godavari.-

The under structures he added were ten in number 1.22 m x 0.91 m (4 ft. x 3 ft.) with their sills 3.05 m (10 ft) below the crest. Simultaneously in 1839, a bridge consisting of 30 spans of 9.14 m (32 ft) each was built over the Grand Anicut for ease in operation during floods.

Since then several improvements were carried out in stages in the Grand Anicut complex which may be recorded here for maintaining continuity of thought and to appreciate how all the time the base structure left by Raja Karikala Chola was kept intact since no one dared to disturb it in the process of modernising. When the bridge was constructed in 1839, the effective length of the Anicut got reduced to 224.0 m (735 ft). In 1886, automatic falling shutters 0.86 m (2ft.10 in) high, were installed over the crest of the Anicut to provide adequate waterway to discharge the floods. Thirteen years later in 1899 these falling shutters were replaced by lift shutters 9.75 m x 1.52 m (32 ft x 5 ft) size designed by Col. Smart and fabricated in the Public Works Workshop in Madras and they stay on till to-day. When a new diversion structure is proposed, the anicut is first designed and constructed across the river course and along with it, the head regulator for the irrigation channels taking off from the river and the necessary scour vents or alternative silt exclusion devices are provided. The Grand Anicut structure is unique in this respect. This however was built on the left bank of the River Cauvery to maintain higher flow levels in Cauvery and spill the surplus into Coleroon. The Cauvery continued to flow into the delta with no regulator to control the discharges. Vennar, the river to the right of Cauvery, had its open off-take about 5 km upstream of the Grand Anicut location.

While the Upper Anicut, the Cauvery dam and the Grand Anicut ensured adequate flows being carried by Cauvery and Vennar for the delta irrigation there was no means of avoiding flood waters rushing into the delta streams in unrestricted large quantities thus creating breaches in the rivers and channels and causing heavy flood damages. For a along time this helpless state of affairs continued. The first proposal for the regulation of floods entering into the delta unchecked were made by Captain Mead in 1870. He suggested regulators being built on Cauvery and also Vennar at the head of the delta close to the Grand Anicut. Major Montgomerie who was asked to examine the proposals gave his report in 1881. He made a recommendation which was relevant in the situations then existed and said that the outlets to be built across Cauvery and Vennar should have adequate vent way to pass all the local floods. He rightly felt that each section of the delta should pass its share of the floods minimising concentration of damages in particular routes. At times of normal flows the regulators would control the distribution of flows between Cauvery and Vennar.

Major Montgomerie's recommendations were revised by Colonel Mullin and a decision was taken to build the head regulators for both Cauvery and Vennar about 61 m (200 ft) downstream of the Grand Anicut and at right angles to the same. The Vennar head thus got shifted downstream with the course above being subsequently abandoned. The plans and estimates were sanctioned for Rs.6.88 lakhs in the proceedings No. 7781/21.9.1883 of the Government of Madras.

The Cauvery Regulator has 14 spans of 11.28 m (37 ft) each and the Vennar Regulator has 11 spans of the same length. Each span is divided into three openings of 3.05 m (10 ft) each with intermediate piers 1.05 m (3½ ft.) each. The floor consisted of concrete apron 1.52 m (5 ft) thick protected in front and rear by retaining walls taken down into the clayey sub-soil below. The foundation concrete was made up of one part surkhi mortar, two of clean river gravel and three of well-burnt broken brick. The foundations of the front retaining wall were taken down 3.05 m (10 ft) below sill and those of the rear 3.35 m (11 ft). The concrete floor however rests on sand and there is a thickness of 0.3m to 1.2m (1 to 4 ft) of sand below the bottom of the floor of the Cauvery Regulator while the depth below the floor of the Vennar Regulator was about 0.15 m (6 in).

There are rough stone aprons in front and rear of each regulator of 4.45 m (15ft) and 9.90 m (30 ft.) width respectively, the aprons resting on sand. The shutters of the Cauvery Regulator are 2.73 m (9 ft.) high and the vent way above the top of the shutters have been blocked with masonry resting on concrete beams.

Owing to the existence of the layer of the sand referred to above, it has been considered that the regulator would not stand a difference of water-level of more than 1.82 m (6 ft) between front and rear. Later the permissible difference has been increased to 2.75 m (9 ft) as the work has been found in actual practice to have, stood the difference safely. This restriction was carefully observed during flood regulation. But to this extent the original object of the regulators which was to exclude the floodwaters from entering the delta in all but extraordinary floods was not realised.

The Grand Anicut would have weathered many a high flood in the times of unrecorded history. Known floods of high magnitude have occurred in November 1858, July 1896, November 1906, July, 1911 and November, 1920. Cauvery, normally carries high floods during the south-west monsoon; but there have been periods when large floods have hit the delta right in the north-east monsoon, when along with the delta rains causing local floods, the flows from the uplands and also from the higher regions have also telescoped and caused heavy discharges.

The periodical improvements to the Grand Anicut and the several outlets that have been constructed on the Cauvery arm above Grand Anicut have served to safeguard the structure limiting the flood discharges it had to take. Breaches that occurred in August 1909 in the Cauvery bank have, however, been due to leakages that have developed earlier. *The failure was not so much due to the incapacity of the anicut to discharge the flood volumes.*

Though at times of heavy floods reaching the anicut, part of the floods were discharged through the Cauvery and Vennar arms through the regulators, care was always taken to see that the difference between the water levels upstream and downstream of these regulators never exceeded 2.75 m (9 ft.) which, to a certain extent, restricted their usages for flood discharges. At such critical situations momentarily safety of the entire complex used to be feared but fortunately nothing untoward has so far happened.

The latest large flood that has been passed through before the construction of Mettur reservoir was in 1924 and it was estimated to be of the order of 12, 900 cumecs (4,56,000 cusecs). Even though large part of this has been carried by Coleroon from Upper Anicut itself, still the accumulation of flood above Grand Anicut was quite heavy. The need for an additional by pass above the anicut was immediately felt. On the left bank of Cauvery at about 2 km upstream of the Grand Anicut a by pass of length 1219 m (4000 ft) was then created which would surplus 2792 cumecs (98,6000 cusecs) into Coleroon reducing the load on the Grand Anicut to that extent.

Floods of high magnitude received after 1924, in the years 1961 and 1977 have caused breaches in Cauvery bank. But the structure has been safe with very little or no disturbance even to its apron.

The safety stipulation that the difference in water level between front and rear of the Cauvery Vennar Regulators should not exceed 2.75 m (9 ft) virtually resulted in the flooding of the delta when it is already suffering from heavy drainage congestion due to the monsoon rains. In the modernisation programme for the delta, flood relief is also an important component and to this purpose all the structures in the Grand Anicut complex have been examined for structural stability and safety and strengthened to the needs, such that the flood flows into the delta through the Cauvery, Vennar and Grand Anicut Head Regulators could be completely cut off by full closure of all the regulators irrespective of the differential head developing.

These strengthening works were taken up in 1972 at a cost of Rs.121.00 lakhs. The maximum flood that may be realised at the Grand Anicut was estimated at 1.80 lakhs cusecs and this would raise the front water level to RL +61.567 m (202.00 ft). To withstand this water pressure, the aprons in front and rear were extended and provided with cement concrete cut off at the ends. The safety of the structures against creep and uplift was checked using Khosla's theory. Energy dissipating devices like the baffle walls and stilling basins were created behind the Head Regulators wherever found necessary.

Another major improvement since made is to energize the shutter operation in all the Head Regulators in the complex and the Grand Anicut by providing electric motors. This has eased and quickened the shutter operation remarkably which incidentally ensures uniform opening of the shutters during all stages of water regulation.

The old structure thus continuously updated though its existence of eighteen centuries is now conforming to latest hydraulic design and equipped with the modern operational facility Map 5.1 shows the General Plan of the Grand Anicut Complex as it exists today.

Sir Arthur Cotton after deciding on the construction of the upper Anicut on Coleroon at the Head of the delta, examined the course of the Coleroon downstream and felt there could be a case for harnessing the flows entering the Coleroon both at Upper Anicut and also the surpluses joining from the Grand Anicut; a little lower down to improve the withdrawals through the Vadavar and Rajan Channels that were taking off from Coleroon on either bank. Vadavar taking off on the left flank was feeding the Veeranarayanan reservoir. Veeranam tank has formed in the first half of 10th century by Paranthaka Chola as mentioned earlier. There were also, the Rajan Channels south and north feeding the command on either flank of the Coleroon in the estuary. From the name we may have to presume that they should be the handiwork of some Chola Raja, who should have thought of extending the benefit of irrigation to the north of the Cauvery old delta. Map 5.2 shows the relative locations of the commands under these channels and the Veeranam tank and its chain tanks of Perumal Eri, Wallajaheri with reference to the spread of the old delta. A note on the Veeranam tank is given at Annex-5.1. *Map 5.3 shows the Cauvery basin.*

Sir Arthur Cotton designed an anicut to be built across Coleroon 154 km (96 miles) below the Upper Anicut and 25 km to the north of the Kumbakonam town to provide the necessary command levels for the channels taking off from the Coleroon perhaps with open heads. He got the work sanctioned by the government on the 31st July 1835 and executed it in a great incredible speed by 1836. He sank brick masonry wells in the wide sandy bed and erected the body wall with the necessary aprons. The credit goes to the managerial skill of col. Sir *Arthur Cotton and the large band of native workmen and mistris' he was able to muster to work* with him with the same dedication. But the Lower Coleroon Anicut being the last structure on the river had throughout a chequered history wearing out the fury of the floods. The first breach occurred in November 1837. Being near the coast, more than the floods that run down the river form upstream, it is the floods caused suddenly by the cyclonic high intensity north-east monsoon rains during the months of October to December that created damages to this structure often. The damages were rectified at a cost of Rs.21, 008/-. In 1854 the anicut was extended and improved at a cost of Rs.70,000/- and a bridge was constructed over brick arches at a cost of Rs.30,000/- to prove a means of crossing.

The very heavy flood in Cauvery in August 1856 passed down Coleroon and caused heavy damages to the structure. Closely following this, the severest flood ever known occurred on the 22nd November 1856 with an incessant rain amounting to about 330 mm falling within 48 hours on 20th and 21st November. Coleroon rose 3.66 m (12 ft.) above the anicut body wall and was flowing within 3.65 m (8 inches) of the crest of the arches. Many of the arches cracked and several piers got undermined and collapsed. Extensive repairs were undertaken and the whole work strengthened building in deep cut off walls both upstream and downstream and the structure got a new lease of life by 1898-99 with the shutters 9.14 m x 1.83 m (30 ft x 6 ft.) erected over a low body now capable of discharging a flood of 8,490 cumecs (3,00,000 cusecs). Some more improvements were carried out at a cost of Rs.8,16,000/- during the year 1929-30 *after the record floods of* Cauvery in 1924 were passed by adding 10 more vents to the South Branch of the Anicut.

The structure as it stands to-day spans on the two branches of the river Coleroon with an island of about 365 m width. The salient features are :

North Branch :	Vents - 30 nos. with gates 10.16 m x 2.74 m (33 1/3 ft x 9.0 ft)
	Sill +14.18 m (+46.34 ft.)
	Under sluices 8 Nos. 1.83 m x 3.66 m (6 ft x 12.0 ft)
	Sill +13.37 m (+43.72 ft.)
South Branch :	Vents 40 Nos. with gates 10.16 m x 2.74 m (33 1/3 ft x 9.0 ft)
	Sill +14.18 m (+46.34 ft.)
	Under Sluices B Nos. 1.83 m x 3.67 m (6 ft x 12.0 ft)
	Sill +13.37 m (+43.72 ft.)

Head Sluices

a) Vadavar	2 vents 6.12 m x 3.6 m (20 ft x 10 ft) and
	3 vents 5.20 m x 3.6 m (17 ft x 10 ft)
	Sill +13.54 m (+44.28 ft.)
	Full supply : 622.6 cumecs (2200 cusecs)
	Ayacut served 28,870 ha (71,285 ac)
b) North Rajan	4 Vents 1.22 m x 1.53 m (4 ft x 5 ft)
	Sill +13.72 m (+44.84 ft.)
	Full supply : 197 cumecs (696 cusecs)
	Ayacut served : 12,083 ha (29,835 ac)
c) South Rajan	2 vents 2.44 m x 2.14 m (8 ft x 7 ft)
	Sill +13.57 m (+44.37 ft.)
	Full supply : 125.37 cumecs (443 cusecs)
	Ayacut served 10,566 ha (26,089 ac)
d) Kumikki	1 Vent 1.83 m x 2.14 m (6 ft x 7 ft)
Maniyar	Sill +13.57 m (+44.37 ft.)
	Full Supply 9.05 cumecs (32 cusecs)
	Ayacut served 2,010 ha (5,111 ac).

The Cauvery delta, which has been and would be the largest contiguous patch of irrigation area in the state also received the due attention in improvement and maintenance during the British Rule. The delta is a creation of the natural processes of any river system at its estuary. Cauvery delta served by the several distributories into which the main river splits itself has been a fertile alluvial plain most suited for rice cultivation and the people living in the delta area have for generations been engaged in irrigated agriculture. Ever since Raja Karikala Chola times (2nd century AD) and possibly several centuries earlier, they have been raising their crop through inundation irrigation and have experienced the good and bad of such a system. The Cauvery at the Grand Anicut sub divides into two main rivers viz. Cauvery and Vennar which sub divide further down as they approach the sea into 21 and 15 rivers respectively to feed the delta though a net work of main channels and numerous branch channels, minors and sub minors. This network of channels must have been created over a long period of time by the rulers and the beneficiary to lead the river water to irrigate their lands.

With no storages or control structures on the river, at that time, Cauvery has been bringing down the floods generated upstream during the south west monsoon period which flowed down partly in Coleroon and partly through Cauvery and the floods that entered Cauvery naturally ran down through the several branches and the

irrigation channels to inundate the fields. Farming started with the first flush of such floods by about the middle of June and the crops were sustained by the river flows till about the end of October after which the north east monsoon took over and lashed the delta with intense rains through depressions and cyclones. While there was abundance of water for rice cultivation, the damages due to floods were also frequent and heavy.

The delta fanning out into a wide expanse with a base of about 125 km along the sea coast covering a gross area of about 6.88 lakh ha (17 lakh ac) carrying 3.78 lakh ha (9.34 lakh ac) of irrigated extent, is a flat plain with very mild slopes. Hence these natural rivers and channels have been functioning as drainage carriers for most of the time serving as irrigation sources as well.

With the construction of the Upper Anicut in 1836 and the Head Regulators across Cauvery and Vennar at the Grand Anicut in 1886, some control of floods entering the delta was possible; but still the delta rivers had also their share of disposing off the floods and the river courses, river banks and the inundation channels had to be safeguarded by introducing more regulators on the branch rivers all along the route. These were taken up in stages and we now have control structures on the branching rivers in all junctions. Besides introducing physical control structures, mostly gated vents with arched bridges over them, suitable rules of regulation were also framed detailing the division of flows among the branches in these junctions. Generally, the rules provided for division based on the ayacut to be served downstream of the junction in direct proportion. Many of these structures last till date with a few repairs and improvements done on their aprons and wings now and then.

A statement of a few major improvement works carried out in the Cauvery delta system from 1890-91 to 1944-45 as culled out from records is given in Annex-5.2.

After the river Cauvery crosses the eastern ghats it turns south, enters the plains and flows towards the delta. The bed slope flattens, the flow-depths become shallow, the bed widens and the river drops a lot of its sediments. The river is with its largest bed width above the Upper Anicut and is hence also called **'Aganda Cauvery'**. This gave scope for the use of the river flows for irrigating narrow ribbon-like strips of land on either bank through excavating a number of channels, which were at the time with open heads. These river channels brought fertility all along the river wherever the banks were low in the Salem and Tiruchirapalli districts and are even now termed as Salem-Tiruchi channels as a group. In order to draw the waters into those channels when the river flow is manageable, the beneficiary farmers used to form temporary barriers across the flows called Korumbus (earlier described) and those used to get washed away with floods to be reformed again and again at great cost and effort. The flows that could be drawn were thereby unsteady and unreliable.

The unprecedented floods of 1924 in the Cauvery which remains as the largest floods passed by the river in the recorded history, caused bad scours and shoals in the bed, shifted the deep water courses and made formation of the Korumbus any more difficult.

A permanent solution was sought for the proper withdrawal of flows through these channels by constructing a masonry bed regulator with necessary scouring and head sluices and thus a scheme called the Kattalai Bed Regulator Scheme was conceived and executed between 1931 and 1933 across the river Cauvery near Mayanur in Kulitalai taluk of Tiruchirapalli district, it is a weir structure 1,293 m (4,225 ft.) long carrying in falling shutters for part of its length with 3 Nos. 6.12 m x 2.60 m (20 ft x 8½ ft) scouring vents on its right and 1 vent of 5.50 m x 1.31 m (18 ft x 4 1/3 ft) on its left end for the North Bank Canal. The weir has been built with adequate cut off in front and rear and elaborate apron features. The weir serves a group of channels now brought into clusters by suitable linkages under the South and North Bank canals providing the necessary head. A new canal called the Kattalai High Level Canal has also been excavated and added on to the group under the South Bank Canal giving irrigation to about 7,695 ha (19,000 ac). The total ayacut served by this Kattalai Bed Regulator is 30,894 ha (76,281 ac) and most of these channels also got improved with control structures.

5.6 Mettur Reservoir: The first storage reservoir across Cauvery in Tamil Nadu was built at Mettur between the years 1928-34 with a capacity of 2,645 Mm3 (93, 470 Mcft). This remains to be the largest storage in the state even today. Besides stabilising the existing irrigation in the basin below the reservoir, an extent of 1,22,000 ha, (3, 01,000 ac) of new irrigation was planned adjacent to the Cauvery delta which was to be served by a new canal called the Grand Anicut Canal. The head sluice for the grand Anicut Canal was also hence located next to the Cauvery Vennar Regulators. This has six vents 9.15 m x 1.68 m (30 ft. x 5½ ft) each and the vents are fitted with radial shutters. The Grand Anicut Complelx thus contains the old anicut severally modified, the Head Regulators for the rivers Cauvery and Vennar and for the newly excavated Grand Anicut Canal.

The most notable work and the one which is giving enduring benefit that was executed by the British is the creation of the Mettur Reservoir on the river Cauvery, the storage of which has stabilised the irrigation in the basin. This reservoir lies, just below the Karnataka Tamil Nadu border as the river emerges out of the eastern ghats.

The yield in Cauvery is mainly dependent on the south-west monsoon which influences large parts of its catchment lying in Karnataka and Kerala territories upstream and the river rises in flood frequently in the months of July and August. As the south-west monsoon recedes, the low flows in the river could not support the crops raised in the Cauvery delta. The north east monsoon is undependable and fails frequently with the result the delta irrigation used to suffer badly just at the time when the crops were in the maturing stage.

Referring to pre-Mettur condition of river supply and rainfall, the renowned Irrigation Engineer, Col. Ellis writes: "Taking the Delta as a whole, it is observed that both the river supply and rainfall are precarious. The Cauvery water being very heavily drawn on when low, frequently runs short, with the result of deficient crop yields and occasional complete failure in some places. Consequently, Tanjore irrigation is at present far from satisfactory and susceptible for considerable improvement".

It was with the chief aim of storing the waters of the surplus floods in the south-west monsoon and distributing them evenly throughout the irrigation period, the Mettur Reservoir was conceived and formed.

Though proposals for Mettur Reservoir in the present form were formulated by Col.Ellis in 1910, the Mettur Reservoir was contemplated even in 1834 by Sir Arthur Cotton..There were several suggestions and alternative proposals made at different points of time, of which the proposal of Mr. Moss made in 1904 deserves mention. The Project as formulated by him was "designed

(a) to protect all existing irrigation area in the Cauvery delta and to extend the double crop area

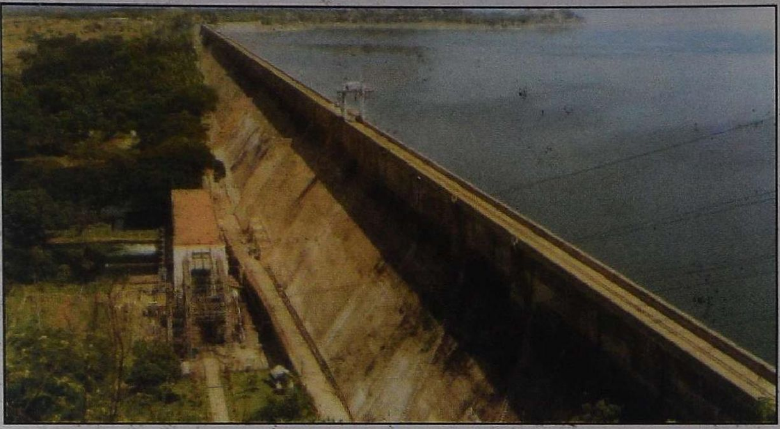
(b) to extend irrigation to new areas and

(c) to irrigate by channels taking off direct from the reservoir on both sides of the Cauvery in Salem and Coimbatore (now Periyar) districts

The project as formulated by Col. Ellis was designed "to secure an adequate supply at an earlier average date than here-to-before, both for double and single crop lands" and extension of irrigation to new areas by excavation of a canal from Grand Anicut.

The Project as sanctioned provides for construction of a reservoir of 26.48Mcum (93.5 TMC) capacity across Cauvery at Mettur and extension of irrigation to a new area of 1.22 lakh ha (3.01 lakh ac) comprising of 1.09 lakh ha (2.71 lakh ac) under a new canal taking off from the Grand Anicut and 0.12 lakh ha (0.30 lakh ac) by extension of the Vadavar canal of Vennar. In spite of the fact that the Cauvery Mettur Project had an excellent technical superiority and an unquestioned economic viability, it had to wait at the doors of the Government of India for years for clearance for the reason that a water dispute had arisen between Mysore and Madras and it could be taken up only after the 1924 Agreement was concluded.

The Project was taken up in July 1925 and completed by 1934 strictly as per the directions in clause 10 (v) of the 1924 Agreement. The project was inaugurated on 21.08.1934 by the then Governor of Madras, Sir George Frederick Stanley, whose name the reservoir now bears. This reservoir was considered the largest in the world at the time of its construction. The salient details of Mettur dam are given in an Annex-6.4.



Mettur Dam

All the sluices are electrically operated with provision also for operation by manual labour. Drainage Gallery 2.14 m x 2.32 m (7 ft x 7½ ft) runs through three fourth of the length of the Dam.

The Mettur dam is the first of its kind in the world when it was built, in that, a straight gravity dam of that length 1622 m (5300 ft) and height 65 m (214 ft.) had not been built anywhere till then. Credit, therefore, goes to the British Engineers who launched this project with the confidence in the latest dam building technology that had evolved, of course after getting the designs properly scrutinised by the highest technical expertise then available. Even then they could not risk the spillway being accommodated as a part of long masonry structure. The possible stresses and strains that will be induced on the body of the structure when flood waters pass over and spillway were not clear at the time and the more important part is that there was no parallel to decide on the energy dissipation arrangements to be made behind the spillway blocks. So they had to go through the elaborate process of lowering a saddle that was luckily available on the left flank end and introduce a gated regulator therein with 16 vents of size 18.3 m x 6.12 m (60ft x 20ft) with sill (20 ft.) below the FRL. This structure is called the Ellis saddle named after the great engineer who built it. It is a fine structure in ashlar stone laid-out in plan, as an arc of a circle to accommodate the length required for the designed flood discharge. A new flood channel was excavated and carried futher to be let into the river course downstream.

The History of the Cauvery - Mettur Project written in 1936 by Mr. C.G. Barber who served in the project as Superintendent of Works is an interesting true account of all the events from its inception upto the time of its completion of the many events which led to the change both of design and location of the dam and of position of the canal system and of the methods of construction employed. The Central Board of Irrigation and Power has reprinted this history as its Publication No.185 in 1987. This publication carries valuable information on the execution of this multi purpose project.

5.7 Irrigation Development in Palar Basin: Turning our attention to the other river basins of Tamil Nadu which are of course less important than the Cauvery basin, it is seen that there has been a concerted effort to improve the existing river irrigation systems towards the end of the 19th Century by which time perhaps the Public Works Department got well stabilised and got into grips of the need for improvements. The improvements mainly consisted of improving the channels taking off from the rivers, provision of head sluices, improving or constructing a new weir across the river to provide the necessary driving head and improving the channel system to provide either direct irrigation or feed the existing tanks en route and stabilise the indirect irrigation.

Perhaps the work done in the Palar basin is a good example to illustrate the above. The river Palar rises in the Nandi hills near Bangalore and enters Tamil Nadu of course draining a small catchment in the Andhra Pradesh too. Though its basin in Tamil Nadu is wide and extensive it lies in the rain shadow area with a poor rainfall of about 850 mm mostly during the north east monsoon period. Floods in this river are rare and short lived and the river flow can be caught and diverted inland only through channels to be stored in the tanks. This is what the ancestors did by excavating channels like the Kaveripakkam channel and the Idusi Mamandoor channel forming temporary bunds or Korumbus to assist the drawal of water.

The possibility of constructing a permanent masonry anicut across Palar about 7 km east of Arcot town at the head of the Kaveripauk channel was investigated even as early as 1840. But a concrete proposal was made to the Government only in 1853. On the recommendation of the Government of Madras to the Government of India, the work was finally sanctioned by the Honourable Court of Directors in November 1854 for Rs.7,66,144/-. The anicut was completed in March 1858 while some more additional items were put on.

The anicut as built at that time consisted of the body wall 812 m (2653 ft.) long 1.53m (5 ft.) high founded on two rows of circular brick wells, 0.91m (3 ft.) inner diameter and 2.44m (8 ft.) high sunk 3.8 m (12½ ft.) below the river bed.Over the wells a mat masonry 1.3 m (4½ ft.) thick was built with brick in lime over which the 1.83m (6 ft.) body wall was raised. The crest of the anicut was of cut stone and the apron downstream was of dressed stone.

Palar Paranthalar

A head sluice with 18 vents 1.53 m x 1.53 m (5 ft. x 5ft.) each was provided for the Kaveripauk channel on the left end and the Channel itself was widened by 1.53m (5 ft.) for a distance of about 5½ km. This channel was traced and improved and ran eastward for more than 65 km to terminate in the Sreeperumbudur Tank near Madras.

To the further left was constructed another head sluice for the Mahendravady channel with 3 vents 1.53 m x 1.53 m (5ft x 5ft) each to lead the flows to terminate in Manendravady tank.

On the right bank too, head sluices were built for the Sakkaramallur channel with 3 vents 6 ft x 5 ft and the Dusi Tennambattu channel with 15 vents 1.53 m x 0.918 m (5 ft.x 3ft.) to lead the flows to the respective tanks after feeding the tanks enroute. The sills of the south side vents were kept one foot higher than those on the north side to prevent accumulation of sand.

A battery of scour sluices 1.53 m x 1.22 m (5ft x 4ft) 10 on the north side and 20 on the south side end were built in the body wall of the anicut and the southern end.

In 1864-65 the crest of the anicut was raised by 0.612 m (2 ft.) and a deep retaining wall was provided at the end of the rear apron built on brick wells.

This anicut had a chequered history of getting damaged too frequently and getting rebuilt again and again with some improvements here and there. The damages were mostly in the rear apron. This is because of the sporadic floods of large magnitude carried by this river whenever the north east monsoon intensified with cyclonic depressions or storms in the east-coast.

A few such flood damages occurred in December, 1865, October 1874 when part of the body wall itself, breached; in November 1903 when the water level rose to a record height of 2.34m (7.65 ft) over the anicut; in November 1911, when the water level rose 1.98m (6.5 ft.) above crest breaching parts of the body wall, and the apron; in November 1916 and in November 1930 when the water level rose to 2.23 m (7.25 ft.) over the crest and destroyed major part of the aprons; in October, 1935, in November 1937 and then in May 1943, in unusual summer flood due to cloud burst when the city of Madras itself was rocked with inundation and suffering in low areas. The four lead channels taking off from the Palar anicut have several branches and feeders linking a number of tanks enroute. The lengths of the main channels are

Mahendravadi channel	61 km
Kaveripauk channel	18 km
Sakkaramallur channel	33 km
Dusi or Thennambattu Channel	37 km

None of these channels have direct irrigation because the short lived flows of the river can not sustain a crop and hence the whole system is an indirect system with 127 tanks big and small on the northern section fed by the two channels and 47 tanks on the southern section fed by the other two. The ayacut irrigable under these tanks total upto 33, 500 ha (82,718 ac).

Poiney is a tributary of Palar mostly draining the area lying in the Andhra Pradesh and joining Palar above the Ranipet road-bridge. About 20 km above the confluence is built an anicut similar to the one on Palar and taken up more or less at the same time and completed by about 1857.

The anicut consists of a body wall 217 m (710 ft) long and 2.4 m (8 ft) high founded on random rubble masonry 1.83 m (6 ft) high resting over two rows of circular brick wells 0.91 m (3 ft) inner diameter and 6 ft deep. The top width is 0.91 m (3ft.), and carries 0.3m (1 ft) thick cut stone slabs. Rear apron is in steps with a retaining wall at the end 1.22 m (4ft) wide and 0.45 m (1½ ft) high founded on 0.91m (3 ft) dia wells sunk 1.83m (6 ft.) deep. 5 vents of under sluice each 1.53 m x 1.83 m (5ft.x 6 ft.) serve as scour vents on either end. Two sets of head sluices exist, one on either side. The one on the left flank is with 3 vents 5.5 m x 1.4 m (18 ft.x 4½ ft.) fitted with Stony pattern lift shutters in a special programme in 1920-21 while that on the right contains 3 vents 0.91 m x 1.34 m (3 ft x 4.33 ft.) fitted with ordinary shutters. The channels taking off on both sides feed 129 tanks irrigating 8,678 ha (21,427 ac).

As it happened in the Palar Anicut, this Poiney Anicut also had to weather many a flood and got repaired. Flood damages recorded were in 1874, November 1888, May 1909, 1912, 1915, 1930, and 1937. Besides restoring the damaged portions some improvements to the anicut, channels and tanks served were also carried out periodically.

Cheyyar is another tributary of Palar draining parts of the eastern-ghats in the Javvadu hills and joins Palar downstream of the Palar anicut near Walajabad town, east of Kancheepuram. This tributary carries 5 old anicuts feeding small commands in the head reaches by name Chengam anicut, Kothakulam anicut, Erayur anicut, Alathur anicut and the Upper Cheyyar Anicut.

The new Cheyyar anicut was constructed on this river combining with a road bridge on Arani-Wandiwasi Road in 1852 to feed 144 tanks of which 40 are fed directly by the channel and the rest from tank to tank in chain. The ayacut benefitted is 11,664 ha (28,800 ac).

The effective length of the anicut is 98.5 m (321.9 ft) and carries a bridge of 9 spans of 8 m (25.75 ft) and 6 spans of 4 6 m (15 ft) each. It is built on the rocky foundations with brick in lime mortar. The main irrigation channel takes off on the right side at an angle of about 130° with a head sluice of 7 vents 1.5 m x 2.3m (4.25ft x 7.5ft) The anicut also carries falling shutters fitted in 1905. Flood banks have been raised on either side for about a kilometre. These banks breached with high floods of 1903 and got restored and suitable bye-washes were provided. Periodical improvements were made to the channel and the tanks served in 1890s and also in 1921-22 and 1927-28.

5.8 Irrigation Development in Pennar Basin

5.8 Irrigation Development in Pennar Basin : South of river Palar is the Pennar basin ignoring a few minor streams that drain in between. The river is called the South Pennar or Dakshina Pinakini and is seen to be a counterpart of the North Pennar or Uttara Pinakini in Andhra Pradesh in its lay out. Pinaka in Sanskrit means a bow and the Pennar twins are taken to be parts of the string of the bow fully stretched. Strangely both the rivers take their source in the Chennakesava hillsnorth west of Nandidurg in the Karnataka State. There is a mythological story describing the origin of the Pennar twins. Once upon a time Goddess Parvathi is supposed to have sat on the top of these hills facing east and in penance, with the locks of her hair spread out and the waters that swelled and came down the left part of the locks flowed as the Uttar Pinakini while that flowed down the right front of the locks formed the Dakshina Pinakini. Uttar Pinakini among the twins is richer in water potential. Two major works were undertaken in this South Pennar basin during the British period one at Nedungal and the other at Thirukkoilur both being anicut systems.

The Barur Big tank is a very old tank in the Dharmapuri district, which already had a feeder channel taking off as an open channel from Pennar on its left near Nedungal village. There were a few tanks to the right of the river, which had no such benefit of feed form the river.

The **Nedungal Anicut** scheme was initiated as a famine relief work in 1877 to stabilise the supply to the Barur Big tank and then link it to a system to feed 10 more tanks below and to establish a feeder source form the river to the tanks, Devarahalli, Panadur and Odamangalam lying to the right of the river. Among these Panandur and Odamangalam had their own open head supply channels which were not effective and therefore all the three were linked by a supply channel called the Agaram channel taking off to the right of the new anicut.

The Nedungal anicut is built in skew to the river flow on rocky foundation and is 279 m (912 ft) in length. Five under sluice 1.22 m x 1.22 m (4 ft x 4 ft) were provided in the middle of the river and in 1938 four more vents were added at the left end to reduce silt being carried into the Barur supply channel.

The old Barur supply channel was given a head sluice with 4 vents 1.83 m x 1.53 m (6 ft x 5 ft) on the left and the head sluice for the agaram channel on the right is built with 2 vents 1.83 m x 1.22 m (6 ft x4 ft) for reasons of protecting the customary right another sluice has been built further left with one vent 1.53 m x 0.61 m (5ft x 2ft) to feed the Nedungal channel which is privately owned.

In the same famine relief scheme, the old Barur big tank was enlarged form 0.93 Mcum (33 Mcft) capacity to 7.04 Mcum (248.6 Mcft) and two feeder channels excavated to feed the chain of ten tanks below and thus create an irrigation system. The scheme was completed by 1888.

A Perusal of the records brings an interesting feature of the dilemma of the designers in assessing the ayacut that could be sustained. The Pennar river is not perennial, neither it carries flows for long in the monsoon. The designers contemplated three fillings of the enlarged tank and increased its ayacut form the existing 630 ha to 4,555 ha (1,557 ac to 11,251 ac). This was not realised, since the flow observations for ten years 1921-30 showed that the anicut surplused only for about 6 to 9 days in a year whereas they assumed full supply in the feeder channel for 20 days. So in 1919 the Government had to shrink it down to only 2,789 ha (6887 ac) and again in 1931 cut it down and guarantee only for 1,518 ha (3,750 ac) including the existing 590 ha (1,457 ac). Now over the years with groundwater extractions nearly 5,668 ha (14,000 ac) is getting benefit under the system.

The Thirukkoilur anitcut system is by far a better-served system. This anicut about 3 km from Thirukilur stations in the South Arcot district is also one which was built in the British period in 1880s to give a permanent structure in place of temporary diversions, the farmers were making to draw water through open channels taking off on either side of the river Pennar. The river in this location has already descended to the plains and is wide and sandy with low banks and so drawing the floods by the farmers had been a little easy. The anicut is 1279.25m (4197 ft) long and the body wall, was built with brick in lime mortar over a row of sunken wells. Necessary aprons were also provided. Maximum flood discharge over the anicut recorded was 7,639.25 cumecs (2,69,843 cusecs) on 31st December 1903.

Five channels take off from the anicut to irrigate about 12,146 ha (30,000 ac) under the tanks served by these channels.

The Pombay channel takes off on the left bank of the river just above the anicut and feeds a chain of 25 tanks and finally tails into the Varahanadhi river to the north of the basin.

The Malattar main channel takes off from the right-bank just above the anicut and feeds 10 tanks through its branches and feeder link.

The Raghavaiyan Channel takes off from the right of the river and is by and large the largest feeder serving about 60 tanks to the south of Pennar.

Marudur and Sithalingamadam are small channels with head sluices on the right with small ayacut of 263 ha and 223 ha (650 ac and 550 ac) served through local tanks.

Improvements to the system were frequently done more particularly to the tanks in the system besides a proper maintenance of the anicut itself during the period. Major improvements were done in 1890-91, 1894-95, 1895-96, 1896-97 and later in 1921-22.

5.9 Irrigation Development in Vellar Basin : South of the South Pennar basin lies the Vellar basin. Vellar is a river with poor water potential served mostly through the north east monsoon. It drains parts of Kalroyan hills, Shevroyan hills and Kollimalai hills in the Salem district. In the estuarian reach this basin is so flat and the ridge between this basin and the Cauvery basin to the south is so undiscernable that the command of this basin could also get the benefit from the Cauvery Coleroon surpluses. Nevertheless a few diversion works were constructed on this river and its tributary Manimukthanadhi to feed chains of existing tanks. As they had done in other basins the British constructed anicuts for diversion either to replace temporary bunds already existing or new ones to improve the drawal in the existing open channels.

The Mehamathur Anicut was built on Manimukthanadhi in 1870. It is 125.58 m (412 ft.) long and 1.52 m (5 ft) high with three sets of three vents each 1.22 m x 1.53 m (4 ft x 5 ft) in its length to function as sand vents avoiding upstream silting. Only one channel takes off from the anicut on its right feeding 15 tanks to serve an ayacut of 2,105 ha (5,200 ac). The location of the anicut is such that even though floods of such high order rising 4.7 m and 3.2 m (11.6 ft and 10.5 ft) above the crest have been passed in 1890s, the anicut remained intact with the floods discharged on the natural ground on the right margin serving as a byewash. Another interesting information relating to this anicut is that the financial return was seen to be as high as 15% to 18 %, which pleased the British. They sanctioned improvements to the systems including the tanks periodically in 1895-96, 1896, 1897 and 1920-21.

The Vridhachalam Anicut on Manimukthanadhi was built a little earlier to the Mehamathur Anicut in the years 1868-69. The body wall of the anicut is founded on wells and protected on both sides with apron. The anicut is only 101.8 m (334 ft.) long but is provided with sand vents in 3 sets of each 1.2 m x 1.8 m (4 ft x 6 ft) in its length with an additional single vent on either end. Two channels take off one on the left and another on the right. The channel on the right feeds and of 688 ha (1,700 ac) direct while that on the left feeds 14 tanks with an ayacut of 3,124 ha (7,714 ac). This anicut has also been sound in spite of passing heavy floods of 4.04 m (13.25 ft.) above the anicut on the 9th November 1913. The financial return in this case has also been fairly high 15% to 19% which encouraged further improvements by way of branch channels, improvements to tanks and so on periodically in 1890-1891, 1893-94, 1894-95, 1896-97, 1899-1900 and 1932-33.

While the small anicuts described above on the tributary Manimukthanadhi brought cheer to the British with high financial returns they found their stint on the main river was not that easy or cheerful. About 25 km upstream of the junction of Manimukthanadhi with Vellar, there existed an old anicut called **Kotakadu Anicut** with a supply channel taking off to the right serving several tanks and villages which was supposed to have been breached and practically annihilated. The British District Engineer opined in 1860 that there is no question of restoring the anicut and hence a new scheme was formulated in 1868 and sanctioned in 1870 for Rs.2,38,000/- with the hope of realising a return of 21.56%. But unfortunately there was a long delay in completing the scheme due to many reasons including change in design and it took upto 1876 with the

scheme cost going up from Rs.2,38,000/- to Rs.4,48,246/- bringing down the expected financial return to a mere 11.5%. The Government of Madras had to answer several questions from the Government of India on this increase in cost.

The head works built as the **Pelandurai Regulator** with 17 vents of 8.84 m (29 ft.) span fitted with 1.83 m (6 ft.) high counterweight lift shutters also had 6 Nos. 1.52 m x 1.52 m (5 ft x 5 ft) sand vents and a Head sluice of 5 vents 1.8 m x 1.71 m (6 ft x 5½ ft) fitted with screw gearing shutters for the main channel taking off to its right. This channel with a number of branches irrigates about 6,882 ha (17,000 ac) through 20 tanks in 48 villages.

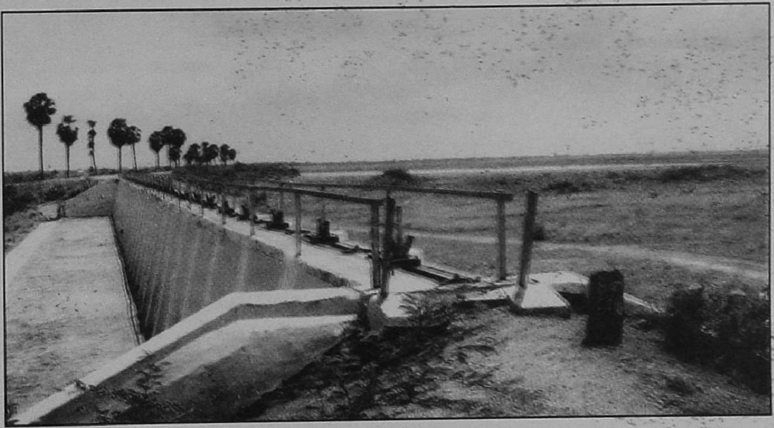
This Regulator suffered extensive damages on 25th October 1877 and November 1880 when the floods rose to 2.13 m and 3.96 m (7 ft and 13 ft) above the crest respectively and had to be repaired at good cost. Because of poor return this system did not get favour for suggestion for further improvements.

The Toludur Project is the one taken up a new by the British in this Vellar basin in the higher reaches about 35 km upstream of the Pelandurai Regulator to utilise the flood waters carried by Vellar during north east monsoon period. This meant a Flood Regulator to be built on the Vellar arm with a feeder channel and the creation of a reservoir to hold the floods and irrigate a command.

A scheme to achieve this objective was being considered and investigated for a long time but took some concrete shape only in 1913 when it got sanctioned by the Secretary of State for India at London since the estimate of Rs.20.64 lakh exceeded the powers of the Government of India.

A regulator called the Toludur Regulator with 13 vents of 9 m x 2.6 m (30 ft x 8.6 ft) with rectangular lift shutters and three scouring vents of 9.2 m x 3.3 m (30 ft x 11 ft) was built across the river combining with a bridge for the Madras-Tiruchirapalli road on top of it. A supply channel with a head sluice of 8 vents of 5.5 m x 2.32 m (18 ft x7½ ft) about 6 km long takes off on the left to fall into a reservoir formed near Tittaudi with a capacity of 68.14 Mcum (2407 Mcft). This reservoir formed was later named as Wellingdon Reservoir in honour of the then Governor of Madras.

The Wellingdon Reservoir on its part has a main channel taking off with a head sluice of 3 vents of 1.53 m x 1.22 m (5 ft x 4 ft) which divides into a number of branch and sub branch channels feeding as many as 23 tanks to irrigate as much as 11,068 ha (27,670 ac). The Project which, was conceived in December, 1913 could be completed only by 1925. The structure did not suffer any damage even in the high floods of 1920 and has been operating successfully since then.



Wellingdon Reservoir

The last structure on Vellar at the head of the estuary is the **Sethiathope Anicut.** This river has not formed any delta and suffers from the fact that it carries only sporadic high flows during intense monsoon period with practically no flows otherwise. Such floods spill all over the place mostly north since the land is flat. The way the river itself is meandering and throwing out branches towards the sea is indicative of its undefined course. All the same, large areas to the north of the river in this reach is very mild in slope, fertile with the alluvium thrown by the flood and carries a few drains which culminate into a big drain called Paravanar which flows north and enters the sea near Cuddalore town which offers a facility for a minor port at the town with the back waters. The river Vellar joins the sea near Portonovo, which might have also served as a small port for landing of boats earlier. Portonovo town is about 30 km south of Cuddalore port.

There are two major tanks, which serve these, fertile tracts north of Vellar called the **Walaja** tank and the **Perumal Eri. Perumal Eri** must be an ancient tank and has a 16.3 km long bund with a narrow water spread with ten sluices feeding the command of 2,387 ha (5,968 ac). It is provided with masonry weirs and bye-passes too. The Walaja Tank is evidently the one probably either created or renovated during the Muslim rule and has also ten sluices with long channels taking off to feed a command of 4380 ha (10,950 ac).

The Raja Vaikal taking-off above Sethiathope feeds the Walaja tank the surplus of which leads to Perumal Eri. By the very name of the channels it is clear that it is pre British period and perhaps dug by some Raja after proving for sort of temporary bunding across the river.

The credit however goes to the British for recognising the need to rejuvenate this system which must have been languishing at the time. As early as 1847-48 even before the Indian territory passed to the control of the crown they built a masonry structure at Sethiathope which was soon destroyed in floods and had to be reconstructed in 1856-57.

This anicut which is now in the form of a regulator has to be repaired, modified and reconstructed several times as it got damaged and mauled by unprecedented flood carried by this river. The cyclone of November 1880 is said to have caused high flows rising 3.96 m to 4.57 m (13 to 15 ft.) above the crest of the anicut and the anicut again breached badly in May 1885.

Presently the structure at Sethiathope is a regulator with 17 spans of 6.40 m (21 ft.) each and 4 nos. under sluices of 3.05 m (10 ft) vent. 2.29 m (7½ ft) lift shutters are installed. The Vellar Rajan channel takes off on the left and has a vent 7.62 m x 2.44 m (25 ft. x 8 ft.). This channel which is about 5 km long as it infalls into Walajah tank has 5 head sluices enroute sending out flows for irrigation though long channels branching off from it and irrigating a command of 17,085 ha (42,200 ac) including the Walajah Tank. The total extent benefited by this system is thus 19474 ha (48,100 ac).

With all these efforts to utilise the flows in Vellar, it was becoming clear that the river by itself could not sustain the ayacut planned under the system. It had been earlier said the ridge between this basin and the Cauvery basin in the south is so low that supplementary feed from the surpluses in the Coleroon could be easily arranged. This was done in stages during the British rule, which has now brought to this system stability in functioning.

A new supply sluice was constructed at northern end of the Veeranam tank, which has the direct feed from the Lower anicut on Coleroon through Vadavar as earlier explained. This new supply sluice has 3 vents 2.74m x 1.98m (9 ft x 6½ ft) for supplying 24.06 cumecs(850 cusecs) to Sethiathope anicut. This work appears to have been completed in 1906. A number of improvements were being periodically made especially to Perumal tank almost every year from 1893 to 1900.

5.10 Irrigation Development in Vaigai Basin : South of river Cauvery flows the river Vaigai in Tamil Nadu. This river rises on the leeward side of the Varshanad ranges of the western ghats, runs north for about 65 km, turns east, east-south east, runs past the City of Madurai and with most of its flows drawn

by several open channels en route to fill in hundreds of tanks gets lost in the vast stretches of the coastal sands. This river has not formed a delta or even a piercing defined course into the sea which indirectly explains its low water potential and maximum utilisation in the basin.

Except for a small part in the upper reaches carrying dense forest in steep slopes, the rest of vaigai basin is all in the dry eastern plains. People living in the basin have been for centuries drawing the river flows whenever it carried the monsoon floods through several river channels to feed chains of small tanks under which cultivation was being carried on. Ramanathapuram district in the lower part of the basin is one with a high density of these small tanks in Tamil Nadu. Two anicuts existed in the pre-British days, the Peranai and Chittanai (meaning big anicut and small anicut) on the main river, from where Vadagarai and Thenkarai channels took off to feed small extents of the ayacut. For some of the channels taking off both on the right and left flanks temporary Korambus were being formed for diversion which got obliterated with every flood. Many channels were just open cuts on the banks without any assistance for flow diversion. On the Surliyar, a tributary to Vaigai in the hill slopes, there existed 15 anicuts with such diversion channels to irrigate 4,858 ha (12,000 ac).

All the same, people in this Vaigai basin were frequently subjected to famines, scarcity of food, suffered poverty and death for the reason that the Vaigai flows were most undependable resulting in crop loss. With the north east monsoon the river may rise in high floods causing damages; but the flow will not last enough number of days for the feeder channels to draw and fill up the irrigation tanks.

It is in this situation, the contribution made to this basin during the British times becomes noteworthy and commendable. Some of the British Engineers who were stationed in the districts in their administration were responsive to the needs of the people and were willing to take the lead in finding out ways of alleviating the sufferings of the people of the area and the administration at the headquarters also gave them a free hand and supported their efforts.

Major Pennycuick who accomplished an amazing challenging task of building a gigantic structure in the most unwelcome dense forests of the western ghats, across a river flowing west to turn the flows towards east through a tunnels across the ridge for the use of those living further away in the plains has gone down in history as a great saviour of the humans in misery. In the process, the mamoth engineering project he completed just a century back was the first attempt of inter basin diversion of this scale in the whole world. We have to salute him who spearheaded the whole scheme and all those who worked with him, men of indomitable will both native and foreign, in the most inhospitable environment against all odds foreseen and unforeseen, with a praiseworthy commitment to the task with the only conviction that they are to bring prosperity to an area frequently drought prone, with a praiseworthy commitment to the task with the only conviction that they are to bring prosperity to an area frequently drought prone, inhabited by poor people who deserved all help to improve their living.

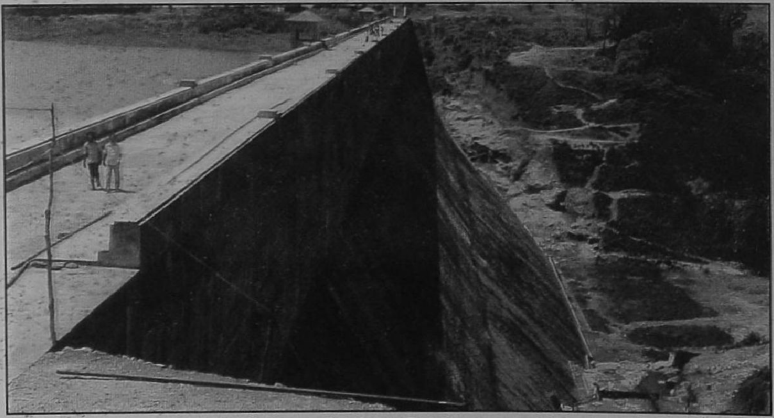
The idea of **diverting Periyar waters** towards east had existed for long among the planners, for they saw just across the ridge the river Periyar draining a densely forested catchment rich in water potential in its head reaches since it was well served by the dependable south west monsoon. The idea could not be translated into action for long because of the challenges it involved and the uncertainties they faced in assessing the water availability and the physical conditions on ground. Feeble attempts were made in 1850,1862, 1867, 1870. It was the severe famine of 1876-77 that struck the Vaigai basin that brought the necessity for this scheme into focus. The Government by an order dated 8th May 1882 relieved Major Pennycuick of all other duties and placed him entirely in charge of this work from the stage of investigation, planning, designing and to execute as well.

The Saga of construction of the dam, the development of the project command in the Vaigai basin with the excavation of the canal distribution system and the benefits that accrued have been truthfully penned by Mr. A.T. Mackenzie, the then Executive Engineer in a book captioned **"The History of the Periyar Project"** published in 1898.

One notable feature that is to be recorded here is the meticulous way the British administration dealt with the legal requirements for transferring the water belonging to the native Travancore State across the ghats to benefit the territory lying in the Madras province under their direct administration. The inter-state issues involved and the manner in which they were met as and when they rose, have been brought out in detail in the rewritten history. Actual work on the project wa: started only after the lease agreement between the Travancore Government and the Madras Government was drafted and signed on 29th October 1886 meant to be in force for 999 years. Through the agreement the Travancore government agreed to demise in favour of the Madras Government all that land that falls below the 47.25 m (155 ft) contour at dam site which was assessed as about 3,200 ha (8, 000 ac) all the water that is generated in the Periyar valley at the dam site for a consideration of a lease amount of Rs.40,000 annual. And this lease agreement was agreed to only after a number of discussions among the parties who had the full freedom to express their views. The Travancore Maharaja was even given the option of joining in the venture as a partner, which he was waiting to consider in the first instance and later withdrew.

The amount of lease and the benefits, derived are not that important. The mutual dignity and trust they displayed to each other and the way they cooperated to get through this project is a lesson to be followed in the several inter-state issues that are arising in the water resources sector in the present days.

The site where Periyar passed through a narrow gorge between two hills was chosen to build across, **The Periyar dam,** Major Pennycuick constructed with a core of lime surki concrete and a thick facing with rough stone in lime surki mortar on either face, is 47.25 m (155 ft) high above the river bed with a 1.22 m (4 ft) thick parapet 0.91 m (3 ft) high and with 3.66 m (12 ft) clear roadway on top. The dam was designed as a gravity structure with and economical section to withstand all the forces with the resultant falling within the middle third. Of course the earthquake forces were not considered at the time. A low saddle on the left was also built across with the same section while another saddle on the right was cut down to +43.89 m (+144 ft) level to serve as the surplus to pass the design flood of 3,595 cumecs(1,27,000 cusecs). To cross the ridge an open cutting with 6.4 m (21 ft) bed with and 1½ : 1 side slopes 1628.25 m (5342 ft) long was made as an approach channel : a tunnel for 1738.58m (5704 ft) was driven designed as 'D' section with 3.66 m (12 ft) width and 2.29 m ((7½ ft) high with a gradient 1 in 75. On the downstream end of the tunnel the channel with an open cut was continued for another 152.40 m (500 ft) before it infalls into the valley of Vairvanar a tributary of Surliyar the main tributary of Vaigai in the Cumbum Valley.



Periyar Dam

The existing Peranai was chosen to be the head works for the canal system and the canal layout laid to the north of the river i.e. on the left. The Peranai was massive stony structure massive in section and was retained at that time adding only a scouring unit of 5 vents of 1.67mx1.83m (5½ ft x 6 ft) on the left end. The head sluice for the new main canal was built a little further to the left with 8 vents 3.05 m (10 ft) spans carrying lift gates 3.28m x 2.44m (10.75 ft x 8 ft.) The main canal was aligned as a contour canal enclosing the command to be served, between the canal on the north, and the Vaigal river on the south with 12 branch canals running down south on ridges towards the river.

The project envisaged irrigation benefits to 36,473 ha (90,000 ac) of first crop and 24,290 ha (60,000 ac) of second crop. Besides the direct benefit of increased food production innumerable intangible benefits accrued once the precious Periya water was spread on land and the area grew prosperous rapidly. One immediate visible benefit was the guaranteed supply to the hundreds of minor irrigation tanks (1312 tanks) big and small which lay within the project command and were taken to be an integral part of the system. This led to very economical use of the waters with these intermediate storages harvesting the rainfall also effectively. The financial return worked out and finally approved by the Secretary of State for India in London at the time of sanction was 6.38%. By 1948-49 the gross ayacut irrigated touched about 80,972 ha (2,00,000 ac) and the net revenue touched Rs.7 lakhs. The project proved highly remunerative even by the time the British left the Country.

Certain improvements, which were seen necessary, also executed in the Periyar dam and auxiliary work after the scheme was completed and started functioning. The right flank was originally left with an ungated surplus with crest at 4.39m (+144 ft.) It was seen that as the irrigation demand increased, the storage that could be retained to be sent through the tunnel above the 35.05 m (+115 ft) level, which was the bed of the approach channel was inadequate. The free surplus weir was hence converted into a gated regulator with the sill at 41.45 m (+136 ft) and carrying gates of 9.14 m x 4.88 m (30 ft x 16 ft) operated with counterweights to hold water upto the FRL 46.33 m (+152 ft) and at the same time discharge the designed flood discharge. The approach channel was also lowered by cutting the rock to 41.45 m (+136 ft.) The works were completed by 1932. The approach channel to the tunnel which was at 35.05m (+115 ft)at its head was also lowered so as to draw the storage in the lake upto a level of 33.22 m (+109 ft)

The anicuts and the channels on the Surliyar which were under the maintenance of the local-Panchayat were taken over by the P.W.D in 1922, repaired and improved to maintain defined section.

In 1905 the Peranai Regulator was remodelled to function as a regulator with 10 vents each of 12.19 m (40 ft) width and with 3.05 m (10 ft) high gates. These works were completed in 1910.

The possibility of utilising the head available at the tunnel exit as it enters the ravines of Vairavanar to generate hydropower was also investigated and proposals got ready. Strangely this could not be pursued, for, at that time there were no takers for the electric power in the region.

5.11 Irrigation Development in Tambaraparani Basin : South of the Vaigai basin is the Tamaravaruni (Tambaraparani) basin. This is a basin which lies totally within the Tamil Nadu limits and hence does not have any inter state ramifications. It is also a basin which is influenced by both the south west and north east by monsoons, has good water potential which had also been harnessed nearly full as it is.

In the previous Chapter details of the several diversion works created on this river and its tributaries by Pandyan and Chola Kings had been given. The Britishers followed suit, improved and maintained these anicuts and added on one more towards the tail end on the main river by name Srivaikuntam anicut. The first seven anicuts on the main Tamaravaruni river which are pre British in origin are (1) Kodimelalagan (2) Nathiyunni (3) Kanadian (4) Palavoor (5) Ariyanayagapuram (6) Suthamalli (7) Maruthur.

The total ayacut under these channels from these seven anicuts both direct and indirect was 33,766 ha (83,402 ac). Besides these, there were 15 anicuts on Chittar a tributary of Tamaravaruni.

About 15 km downstream of **Marudur Anicut** two channels the north main and south main were taking off to draw the flows surplusing the anicut and fill up the tanks on either side of the Tamaravaruni river. About 5,182 ha (12,800 ac) were already getting the irrigation benefits through these tanks and also direct from these channels.

In the British period, **the Srivaikuntam Anicut** was constructed as the eight anicut in the river to stabilise the supply to those existing channels, increase the ayacut and thus spread the irrigation benefit right upto the sea about 26 km away. This anicut thus became the one at the head of the delta.

Engineer Captain W. H. Horsely prepared the first estimates for this anicut with a road bridge on top of it in 1855 for Rs.3,80,000/- which was duly approved by the Court of Directors of the East India Company at London to be taken up for 1856-57. But the Sepoy Mutiny intervened and the work could not be started until about 1867.

The estimate was revised to Rs.7,50,000/- and seeing that the work is not taking off for long, the people in their anxiety to get it started came forward to contribute towards the work to an extent of Rs.20,000/- which after the final collection swelled upto Rs.38,556/-. Perhaps this is the first instance in the British rule when people offered to participate in irrigation development by subscribing their contribution for part of it's cost. As far as the people were concerned, this was nothing new for the reason, they were doing this sort of participatory management for centuries earlier through Kudimaramath and grants from landlords and philonthrophists. The work was completed in 1873.

The anicut is 420.62 m (1380 ft) long carrying a road bridge, the effective length being 381.61 m (1252 ft). 18 vents of 1.22 m x 1.22 m (4 ft x 4 ft) on the northern side and 9 vents of the same size on the south are provided for scour. The north main channel on the left takes off with a head sluice of 6 vents of 1.22 m x 2.44 m (4 ft x 8 ft) and south main channel on the right is provided with a head sluice of 5 vents 3 of size 1.22 m x 2.44 m (4 ft x 8 ft) and 2 of size 1.83 m x 1.83 m (6 ft x 6 ft). Both these channels irrigate the area partly by direct sluice and partly through tanks extending the irrigation benefit practically to the sea end. The north main channel tails into Peikulam tank which surpluses into Pettaikulam which in turn surpluses into Korampallam tank and the South Main channel into Kadamba tank a big tank of 1907 ha (4767 ac) ayacut. The channel taking off from Kadamba tank continues and feeds another tanks. The total extent served by the north main was 4,896 ha (12,093 ac) and by the south main 4,896 ha (12,093 ac) at that time. Since then several improvements have been carried out and the total extent under the anicut is presently about 10,526 ha (26,000 ac).

A pioneering effort made by the British to install a hydro power station in the Tamaravaruni basin deserves commendation. Closely following the **Pykara Hydro Electric Scheme** in Nilgiris completed in 1935 the **Papanasam Hydro Electric Project** was taken up in 1938. This incidentally led to the formation of the first storage reservoir in this basin in the upstream reaches above Ambasamudram town. The Papanasam dam is a straight gravity dam 227 m (745ft.) long founded on solid rock, 66 m (216.5 ft.) in height with a gated spillway of 15.85 m x 5.49 m (52 ft x 18 ft). The forebay for the powerhouse is a little downstream created by a weir 409 m (1,342 ft) long from where two pipe lines are laid in a tunnel 1,093 m (3,586 ft) in length to reach a differential type surge shaft. Four penstock pipes 1.75 m (5.74 ft) dia run down from the surge shaft for 196.29 m (644 ft), in steep slope to connect to the Powerhouse. With a head of 100.59 m (330 ft) available four reaction turbines run with an installed capacity 4 x 7MW = 28 MW.

5.12 Irrigation Development in the Kodhayar River System : The Kanyakumari district, the southern most district of Tamil Nadu got added on through the state reorganisation of 1956, and the district areas were till then a part of the Travancore state. The Kodhayar river system in this region was

already being tapped for irrigation benefits through diversion anicuts and channels created by earlier rulers which was briefly referred in the previous chapter.

As the **Periyar dam** was being planned and executed in the northern zone of the Travancore State by the British, the Maharaja of Travancore got a scheme for creation of reservoirs in the upstream hilly region of Kodhayar investigated. The building of Pechiparai dam was taken up in 1895 perhaps emboldened by the success of building the Periyar dam and the structure is with surki concrete core and a facing of rough stone in lime surki mortar. The dam building was completed in 1906 at a cost of Rs.26.07 lakhs. It is a straight gravity dam 425.5 m (1396 ft) in length with an effective storage capacity of 99.42 Mcum (3511 Mcft) and maximum height of 48.32 m (158.53 ft). It has a spillway with 6 vents 12.15 m x 4.57 m (40 ft x 15 ft) fitted with lift gates capable of discharging a flood of 1104 cumecs (39,000 cusecs).

A canal takes off on its left with 2 vents 2.13 m x 2.90 m (7 ft x 9½ ft) with a full supply discharge of 28.74 cumecs (1015 cusecs) and is called the Kodhayar Left Bank Canal. Excavated on contour for 17 km, it links the ancient Puthanar dam on Paralayar tributary of Kodhayar. The Pechiparai storage thus stabilises the entire ayacut served by the Puthan dam with its several old channels and the branches feeding a total ayacut of 25,911 ha (64,000 ac) of double crop in three taluks.

The Pechippara dam also like Periyar dam developed leaks on its rear surface and had to be treated and grouted as has been done in the Periyar Dam. The Maharaja of Travancore should have consulted some dam experts for rehabilitating the dam.

The Paralayar arm of Kodhyar on which the anicut **Putham dam** is built draining a large area in the north-eastern part of the Kodhyar basin remained unregulated causing heavy surpluses in Puthan dam. A reservoir called **Perunchani reservoir** was formed on the Paralayar arm by constructing a masonry dam completed in 1953. This dam is also a straight masonry gravity dam 373 m (1,224 ft) in length with a storage capacity of 2,890 Mcft (82 Mcum) capacity. It had an ungated spillway like the Pechippara to discharge 895 cumecs (31,600 cusecs).

Thus with both the Kodhayar and Paralayar arms in the basin now carrying reservoirs to feed the Puthan dam and the several channels fed by it, the high water potential in the basin available mostly during the south west monsoon could be effectively utilised.

One more work of lasting nature executed in the British period may be referred to here though it is not an irrigation work but a navigation work. In the British period, irrigation and navigation were dealt with together and they tried to introduce the navigation element in the irrigation schemes wherever it was possible.

Also they had organised investigations for new schemes and kept a few schemes in the shelf to be attempted as famine relief works. Famines were frequent and the Government preferred to create works and engage people on wages so that they will have the purchasing power to buy food and live. Import of rice and food from countries like Burma, which was also under the British crown, was done and food made available on cost, may be some times subsidised. Doling out money without any return was not allowed in the British administration. Every thing had a price and there was rigorous financial accountability.

The Buckingham Canal

The Buckingham Canal in the east coast of India which was considered to be one of the longest man made canals in the world at that time was excavated in parts as famine relief work and connected to provide

navigational facility ultimately for a length of 417 km from Marakonam in the south Arcot district of Tamil Nadu to Peddaganjam in the Krishna basin in Andhra Pradesh. Thereon linked to the irrigation cum navigation canals created by Sir Arthur Cotton in the Godavari delta, actually navigation was possible even up to Kakinada.

The Buckingham canal is a coast canal passing through numerous shallow back waters crossing the entire drainage of the coastal region subject to cyclonic rainfall and sea storms and situated along a low sea board with estuaries encumbered by bars and with a small tidal range. It is vulnerable, subjected to nature's fury now and then and the competition in transportation from the Railways and Highways. This canal is therefore in a badly neglected condition, heavily silted up in most parts and with very little traffic in parts of its length.

The first length of this canal was excavated in 1806 by one Mr. Cochrane between Madras and Ennore 20 km north. By 1857 the Canal got extended to Dugarajapatnam 110 km north of Madras and Sadras 60 km south of Madras. In 1876 it was further extended to Nellore 150 km north of Madras. The great famine of 1877 gave an impetus to this venture and the canal got extended to Peddaganjam 315 km north of Madras to Marakonam 102 km away in the south and this length of 417 km was navigable by 1882 when it was named as the Buckingham Canal in honour of the then Governor of Madras. Between 1883 and 1897 this canal excavated in parts with ad hoc design was strengthened and improved as a good locked-in canal with a number of tidal locks constructed and the canal reshaped to design based on some scientific principles.

This canal served for quite some time providing cheap water transport for materials like firewood, salt, shell, food grain, coal and other building materials for the east-coast districts and is presently languishing. Several attempts made to revitalise this good asset have not improved the traffic and it is likely to get revived and serve again when the railways and roads get jammed with traffic, which may not be far away.

5.13 First Irrigation Commission, 1901 : A significant event is the constitution of a special commission by the Governor General in Council on the 18th September 1901 to report on the Irrigation of India as a protection against famine. This is referred to as the First Irrigation Commission of India.

The Commission consisted of

1.	Col Sir Colin C. Scott- Mon. Crieff, K.C., SI	President
2.	Sir Thomas Highan, K.C.I. E.M. Inst. of C.E. Secretary to the Govt. of India, PWD and Inspector General of Irrigation.	Member
3	Hon. Mr. Denjzil C.J.Iboetson, CSI, ICS, Chief Commissioner of the Central Provinces.	Member
4.	Diwan Bahadur P.Rajarathna Mudaliar, C.IE Member of the Legislative Council of Madras	Member
5.	Mr.W.B.Gordon, M.Instt.C.E. Superintending Engineer, PWD United Provinces of Agra and Oudh.	Secretary

The Commission submitted its report after an elaborate exercise in respect of their Terms of Reference with 91 sittings, visits to the Provinces and examination of as many as, 425 witnesses. The Commission even met the Maharajas of the Native States who expressed a wish to meet, to enquire and compare the conditions of irrigation practices in those states with those of adjacent British territory. The Commission presented its report on the 11th April 1903.

For the first time a scientific assessment was made for the entire Indian sub-continent with its large variations, as a whole, of the rainfall and its variability, the soil, climate, the classes of the crop suited to the soil and other local conditions and a record in the form of a report made available. The extent of irrigation as on that time in the Indian Empire was estimated as about 53 million acres of which 7.69 Mha (19 Mac) were from canals, 6.48 Mha (16 Mac) from wells, 4.05 Mha (10 Mac) from tanks and 3.23 Mha (8 Mac) from other.

The Commission realised that a lot of water flows down the rivers to the sea and at the same time has carefully analysed and detailed the main physical conditions which impose a limit to the use which can be made of the surplus drainage of the country. They felt that at best there can be planning for a further addition of 2.63 Mha (6.5 Mac). Several administrative and organisational changes that would be required to effect this improvement in irrigation have also been well thought out and detailed.

In the Madras province which at that time occupied the whole of the southern extremity of the Indian Peninsula almost surrounding the Native State of Mysore, and extended over large part of the present. Andhra Pradesh, parts of Karnataka and Kerala, the Commission estimated that 3.13 Mha (7.75 Mac) were under irrigation (28% of the total area cropped) the bulk of which was situated in the deltas of Godavari, Krishna and Cauvery rivers. The Commission recommended that all works on the tank restoration programme should find a place in the famine relief programme and pursued with vigour.

The Government of India commended this Report to the Provincial Government and the Native States and requested them to implement their recommendations

Till about 1921 when the **Monteagu Chemsford** Reforms came to be adopted the Government of India also had the powers vested with those in sanctioning the execution of capital works even in the provinces and in the case of major irrigation works. The Governor General in Council-recommended the projects to the Secretary of Sate for India at London who looked at the projects sympathetically only when they were remunerative and productive. The provincial Government on their own could only sanction minor and repair works costing not more than Rs.10.00 lakhs and of course execute the works sanctioned by the Government of India.

Through these Reforms the Provincial Governments got some more powers. They were also authorized to raise loans for financing irrigation projects themselves instead of depending on the Central Government for funds and when the irrigation schemes were seen to be 'productive' yielding a return of 6% the Provincial Governments were emboldened to launch the schemes after getting the sanctions. This facility coupled with the economic revival after the end of the First World War in 1901, gave an impetus to the initiation of major irrigation projects in several provinces and also in the native states.

In the mean time the British Policy in dealing with land and water were led to several changes in the erstwhile village structure and in the agrarian economy as well. Credit should go to the Rulers for streamlining the administration in every sphere of life, which led to centralization of powers for enforcing discipline and uniformity. Though the village structure started crumbling down, the Provincial Governance was taking firmer roots.

Ryatwari system was introduced, individual ownership of land and delivery of pattas was systematised. Landowners were also required to pay the land tax and wherever the land was served with irrigation, depending on the reliability of the water source, they were also charged for water along with the land tax. In order to arm themselves with powers **"Madras Irrigation Cess** Act (No.7) of 1865 " was enacted which of course has now got modified severally since then. The objective of this Act is stated to be to enable the Government to levy a separate cess for the use of water supplied for irrigation purposes from any river, stream, channel, tank for work belonging to or constructed by the Government.

The Britishers were very much impressed on the functioning of the **'Kudimaramath'** for the maintenance of the irrigation system by the beneficiaries themselves which was in vogue for centuries. They felt that this practice is to be given a legal status and enacted the **"Madras Compulsory Labour Act 1858 Act No. 1 of 1858"**. This Act among other things provides for the enforcement of customary labour on certain works of irrigation in the state. A copy of the Act is given in Annex-5.3.

In the process of safeguarding the existing irrigation works and also plan to execute new irrigation works it is essential that the Government land is kept free of encroachment. To provide measures for checking unauthorized

occupation of Government lands, the British Government armed itself with an Act called "The Madras Land Encroachment Act 1905-Act III of 1905". The Revenue Administration Department was given the powers to enforce this Act.

On top of enacting all these enabling Acts, the British administration organized the Board of Revenue on sound lines. This Board which consisted of senior members of the Civil Service had control over the functioning of the District Administration on all aspects of revenue collection including the land administration and land use. In their collective wisdom they issued several instructions for the guidance of the district administration which came to be known as the Board's Standing Orders. These orders were at one stage compiled and brought out as volumes of Board's Standing Orders in 1878. These orders were binding on all the line departments in the district administration. Section Chapter-VI of these Boards Standing Orders deal mainly with the irrigation aspects. These Boards Standing Orders have since been revised with a number of rulings having been clarified, with necessary modifications over time since addition of new rulings. The Boards Standing Orders were last published in 1963 and are still in use.

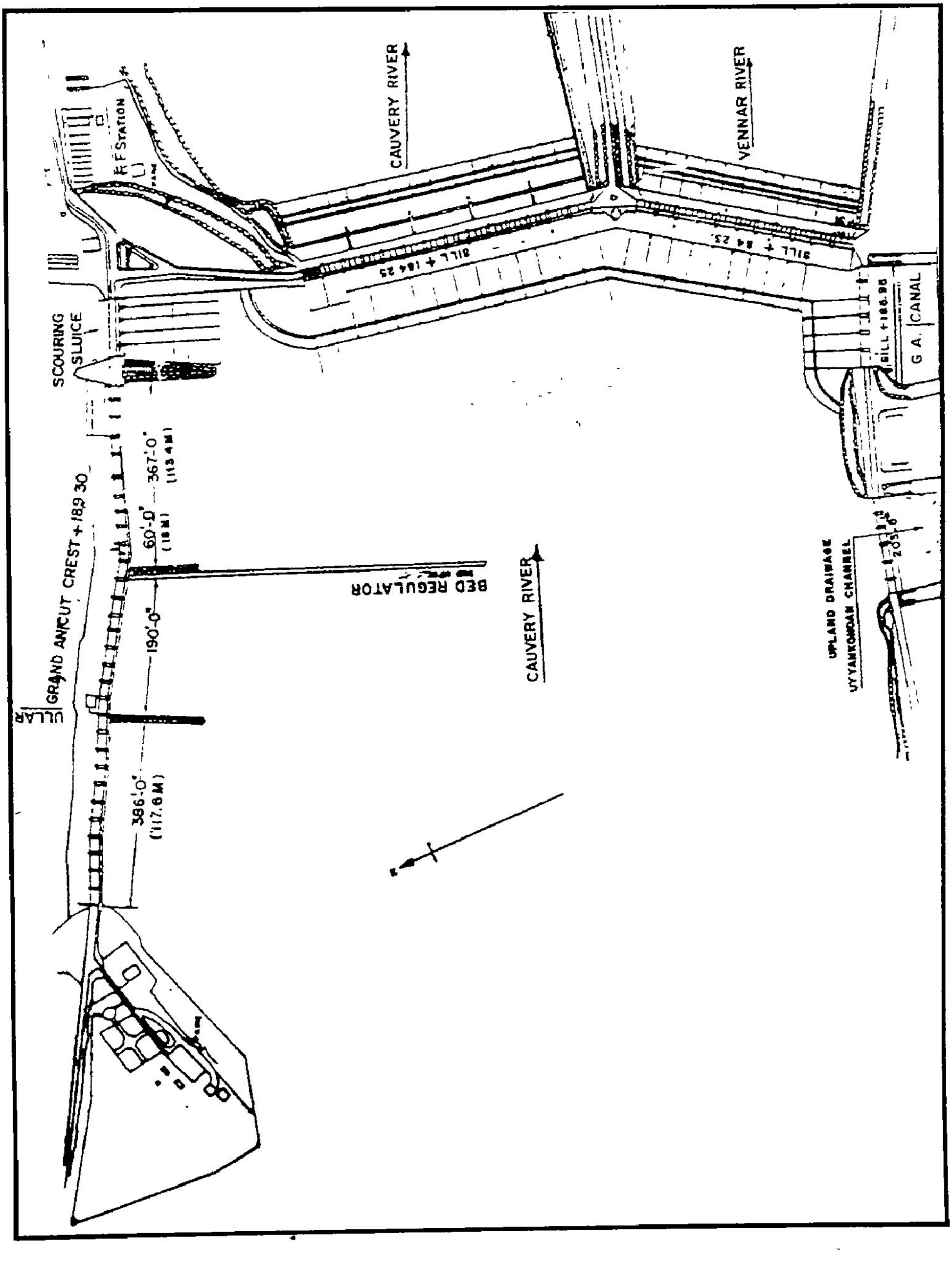
The Government of India Act, 1935 constituted the major instruments of administrative changes enacted by the British crown, in the process of devolution of powers to the local self-government before the final transfer through Indian Independence of 15th August 1947. This Act contained several sections under different chapters, defined the administration of Federal affairs through the Federal Legislature by the Governor General whose powers were also clearly defined. At the Provincial level also, the Governor's functions through the Provincial Legislation were defined and the administrative relations between the Central Federation, Provinces and the Native States and the Inter Provincial cooperation were brought out. The distribution of revenue between the Federation and the Federal Units was stated in clear terms.

The Act provided for more powers to the Provincial States for use, distribution or control of the waters in their territory subject to the restrictions necessary in such use in the inter state rivers where the Federal Government retained the powers to investigate and adjudicate on disputes arising out of interference by one Provincial Government with water supplies have been or likely to be affected prejudicially by an executive action or legislation taken or passed or proposed to be passed or taken by any one of the other Provinces. Many provisions in this Act provided a base on which the Indian Constitution has been framed.

The 1935 Act in general helped in planning the development of irrigation in the Provinces, the Native States and the Country as a whole.

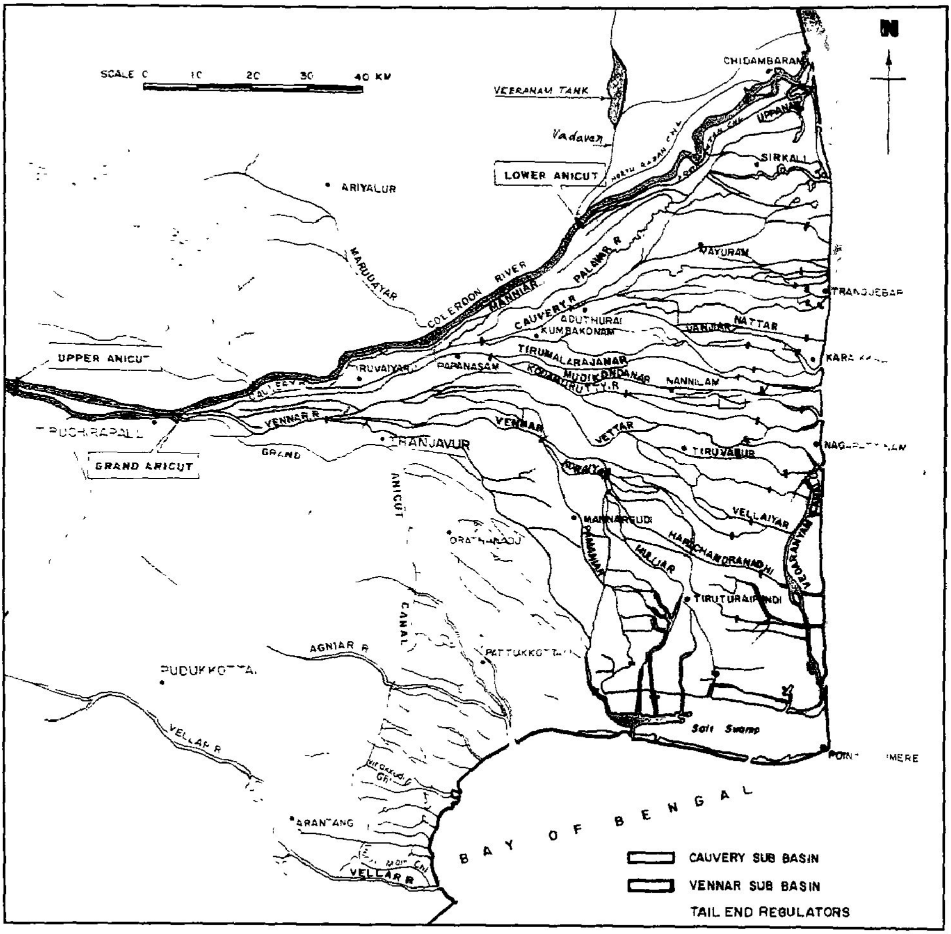
Map 5.1

Grand Anicut Complex-General Plan



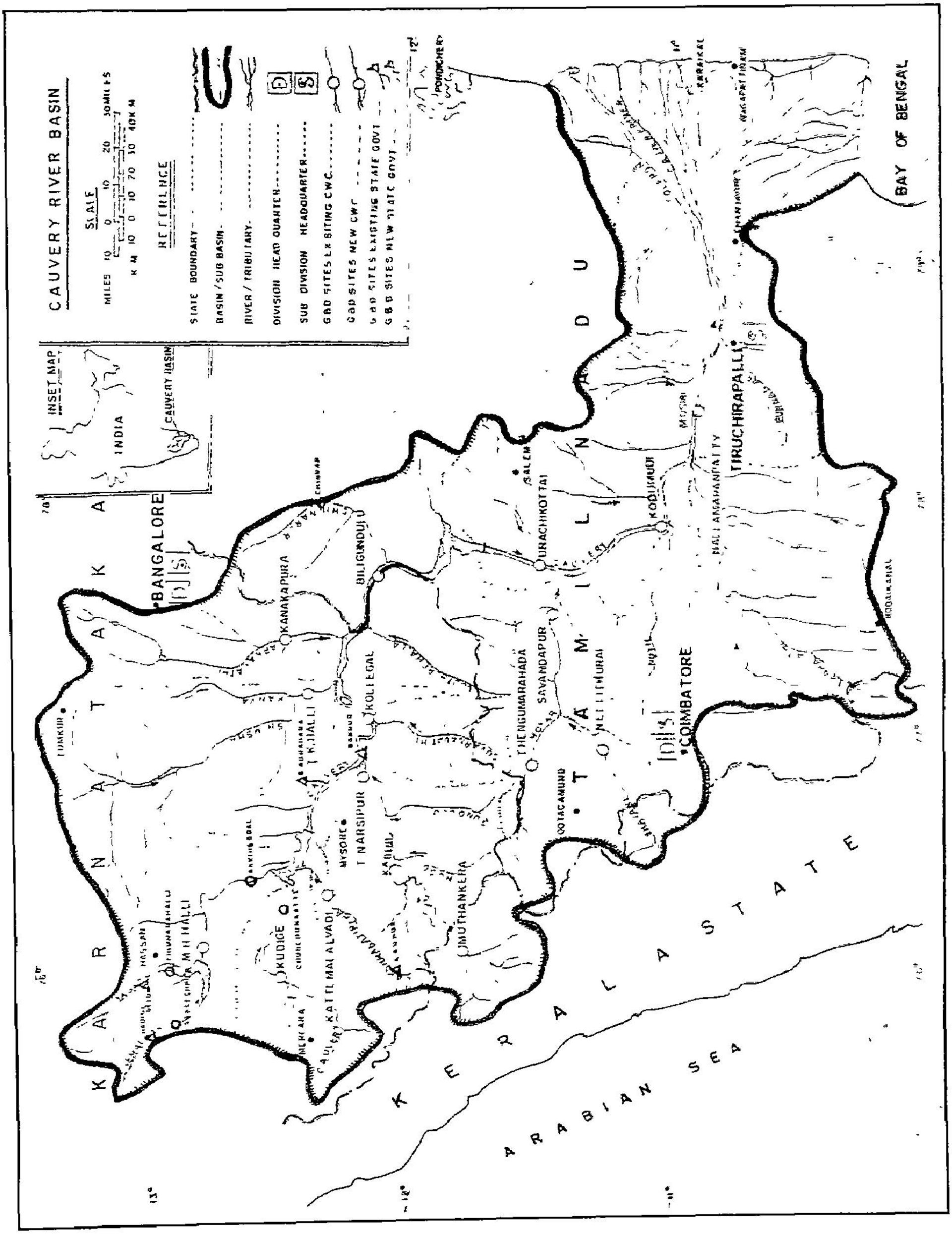
Map 5.2

The Cauvery Delta



Map 5.3

Cauvery River Basin



CHAPTER 6

IRRIGATION DEVELOPMENT - SINCE INDEPENDENCE

6.1 With the dawn of Independence that great visionary and dynamic first Prime Minister of India, Shri Jawaharlal Nehru, initiated and launched Five-Year Plans for overall development of the country. He was clear that the basic infrastructure was to be built up for the people of the country. Agriculture, the predominant occupation of the people had to be developed and all efforts had to be made to grow enough food for the people so that the dependence on imports for food could be reduced if not totally avoided. All the same, he was keen on industrializing to offer employment to people. Development of Irrigation and Power was thus upper most in his agenda and he gave these two areas the primary priority in the planning process.

Planning Commission was established by the Govt. of India in 1950 to start the planning process with the broad objective of assessing the productive potential of material and human resources available in the country with an eye to their optimum utilization within a stipulated period.

Irrigation and Power got the priority and the Ministry of Irrigation & Power was created. The Central Board of Irrigation and Power (CBIP) was activised and the Central Water and Power Commission (CW&PC) was created. CW&PC was providing technical assisting to the Planning Commission in the planning and formulation of irrigation and power projects. The Central Water and Power Commission, was the technical body and was given the responsibility of providing guidance and assisting the states in the formulation of their projects and their formal technical scrutiny at the Union Level so that there was no overlap or over use of the water potential in interstate rivers among the different states. This was necessary because though water, that is to say water power supplies, irrigation and canals, drainage and embankment, water storage and water power was listed under item 17 in the State List in the seventh schedule of the Constitution of India, under entry 56 of List I, i.e the Union List, the "regulation and development of interstate rivers and river valleys" became the responsibility of the Union to the extent such regulation and development under the control of the Union is declared by Parliament by law to be expedient in the public interest.

6.2 In fact at that point of time, the Union Government for convenience in scrutiny and offering administrative sanction had categorised the new projects as major, medium and minor. Projects costing more than Rs.50 millions were categorised as major schemes and projects costing between Rs.2 million and 50 million were classified as medium and the rest minor.

While the major and medium projects were processed by the Ministry of Irrigation and Power in the Centre with the help of the Central Water Commission and had to pass severe scrutiny, the execution of minor schemes was left to the Ministry of Food and Agriculture. Of course since then there have been quite many changes in those classifications with the ministries themselves expanding and contracting.

At one stage irrigation itself came under the Ministry of Agriculture and now it has been brought under a full-fledged Ministry of Water Resources. The classifications of irrigation projects, have also been modified to be judged on the basis of extent of new irrigation brought under the project. Projects which have 10,000 ha area for new irrigation are called major projects, those which have between 2000 ha and 10,000 ha as medium projects and projects with less than 2000 ha as minor projects.

6.3 The Tamil Nadu state was quite quick and responsive in formulating irrigation projects under the Five-year Plans. The then popular Government concurred with the view of the Union Government in totality in that irrigation and power should be given the priority in the development plans.

Fortunately there were number of irrigation projects already investigated and awaiting sanction for a long period The erstwhile British Government was not willing to launch these projects since these were not promising a handsome return of 6% and more on the capital invested. The popular government interested in the fast development and employment opportunities for the people had to relax such stipulation and fall in line with the thinking of the Union Government accepting the evaluation of projects through Benefit Cost ratio. If the benefit accruing from a project was more than the interest on the investment required, then the project was declared eligible for implementation.

Unfortunately water resources of Tamil Nadu are poor as already detailed in the previous chapters. There has been concerted efforts over centuries to harness the rainfall through thousands of small storages and river diversions and not much had been left to be profitably developed by launching major and medium irrigation schemes.

The scope for the major projects in Tamil Nadu is limited and of course that state could pull through three Five-Year Plans with spectacular development and fast growth in irrigation. Thereafter, the feasibility came down and the projects came under the categories of medium and minor. Since most of the ideal sites had already been built on and the water potential largely harnessed, the state had to reconcile to smaller schemes with low benefit cost ratio and at higher cost. Map 6.1 gives "Reservoirs and Irrigation Systems in Tamil Nadu."

Plan-wise irrigated potential created in Tamil Nadu under major, medium and minor projects is furnished in Annex-6.1 It may be seen that the targeted ultimate irrigation potential has almost been reached leaving only a very small gap to be achieved, while there is scope in the minor irrigation through surface and groundwater use. The cost per hectare has been increasing and the irrigation potential has been shrinking as we trace from the First Five Year Plan to the Eighth Five Year Plan.

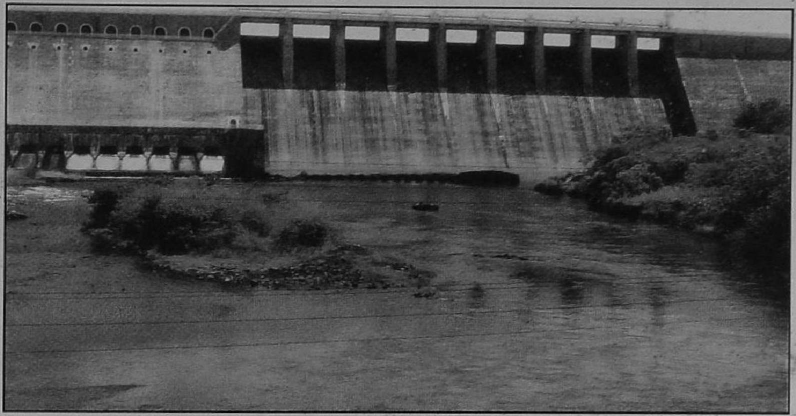
The development of major, medium and minor irrigation (anicuts/reservoirs) in pre plan and plan period up to the end of eighth plan are shown in Annex-6.2. Another statement of financial investments made in the Irrigation Sector for the Major, Medium and Minor Irrigation Projects including Flood Control is at Annex-6.3. It will be seen there from that the share of this Sector in the overall State Plan expenditure has sharply come down from 25 06% to 9.35% even in the II-Five Year Plan and is around 5% thereafter.

Major and medium projects undertaken, each Five Year Plan and Annual Plan are briefly discussed below. Salient features of projects taken up in the state are also furnished in Annex-6.4

FIRST FIVE YEAR PLAN (1951-52 to 1955-56)

Lower Bhavani Project

Mooted as early as 1857 and investigated in detail by a special Division in 1905, this project was more or less kept in readiness to be sanctioned as the first project under the plan. Being the first such major scheme in the state this project attracted a lot of attention. Thousands of labourers congregated at the site and got benefited. The execution was also completed over a very short time considering the magnitude of the project. For the first time, an earth dam of more than 35 m height was tried. Lots of earthmoving machinery was deployed on the work. A detailed "History of the Lower Bhavani Project" written by the engineers who executed the project and published in three volumes in 1965 with all designs and drawings give an elaborate account of the project.



Lower Bhavani Dam

Mettur Canal Scheme

The 1924 Agreement permitted a new area of irrigation under the Cauvery Mettur Project upto 1,21,862 ha (3,01,000 ac). The development of the ayacut under the Grant Anicut Canals excavated under the project took some time and it was also found that the areas that could be developed under the project was only 1,03,644 ha (2,56,000 lakh ac), comprising of 91,903 lakh ha (2,27,000 ac) under the Grand Anicut Canal and 11,740 ha (29,000 ac) under the Vadavar Extension Canal. To make good the shortfall of 18,219 ha (45,000 ac), the Mettur Canal Scheme which was contemplated by Mr. Moss even in 1904 was taken up for investigation. The scheme was sanctioned and taken up in 1949 and completed in 1957 to give irrigation to new extent of 18,219 ha (45,000 ac) in Salem and Periyar districts. The canals system takes off directly from Mettur Reservoir on its right side and has two branches viz. the East Bank Canal feeding 10,931 ha (27,000 ac) in Salem district and the West Bank Canal feeding 7,287 ha (18,000 ac) in Periyar district (earlier Coimbtore district)

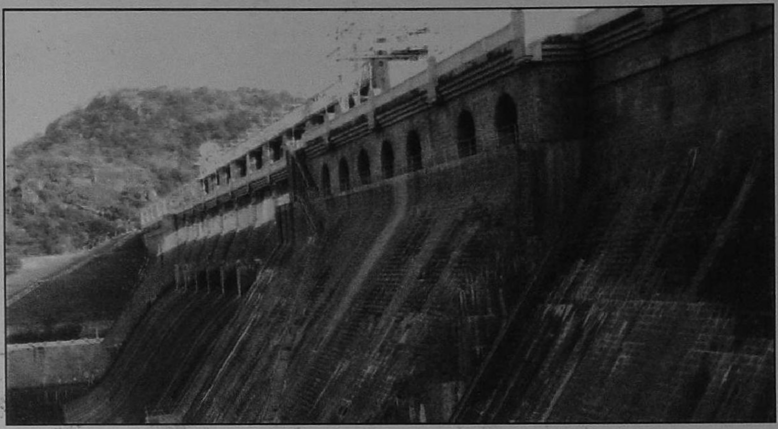
The supply to the Mettur Canals is tapped from the end vent of the High Level Sluice with Sill 219.456 m (+720 ft) of Mettur Reservoir. When the reservoir level falls and no supply can be drained through this vent, the supply is drawn though the end vent of low level sluice, which is modified to empty into a rising well connected to the canal. The success of this scheme depends on the storage that could be maintained in the Mettur reservoir. These canals are opened for irrigation only when sufficient storage is built up in the Mettur Reservoir through the scheduled date of opening is 1st August. The irrigation is given only for one crop. Some years, the reservoir storage was too poor and the opening of this canal for irrigation had been denied.

Manimuthar Reservoir Project

This project had the distinction of the participation of the beneficiary by contributing towards the cost of betterment. In respect of other Plan Schemes a Betterment Levy was imposed and collected after the benefits had actually accrued after completion of the Project. The collection was also abandoned after sometime as the payment was not easily forthcoming.

Amaravathi Reservoir Project

Amaravathi river is one of the tributaries of the river Cauvery in Tamil Nadu. It rises in the Western Ghats near Moonar in Kerala at altitude of about 1,525 m (5,000 ft) above M.S.L. and runs through Annamalai hills



Amravathi Dam

and Amaravathi Reserve Forest in Tamil Nadu, before it enters the plains in Udumalpet taluk. The upper part of the river in Kerala areas is called Pambar it joins the river Cauvery near Karur in Trichy district. The need for a storage reservoir to meet the irrigation needs in the dry areas of Udumalpet and Dharapuram taluks having a very low annual rainfall of about 660 mm, was recognized as early as 1901 and investigations were carried out by Wet Burlton and then by Col. Ellis in 1905. The scheme in its present shape was sanctioned in 1953 and the work completed in 1958. A dam is constructed at the foot of the western ghats at the site about 22 km from Udumalpet town. A 63 km long Canal is excavated on the left bank. The canals runs through Udumalpet and Dharampuram taluks of Coimbatore district, and feed a new ayacut of 8,701 ha in these taluks.

Vaigai Reservoir Project

This project was conceived as an adjunct to the century old Periyar Dam Project already described in the previous chapter. When the Periyar Hydro Electric Scheme was planned in 1952 utilising the head available at the tunnel exit as the Periyar waters diverted from west towards east flowed down, the need for holding

Vaigai Dam

the flows from the tail race when the power house was operated in the non irrigation season was felt and the Vaigai reservoir was formed essentially for that purpose. Incidentally it holds the flood waters of the Vaigai river itself and regulates its use for the Vaigai dependent ayacut.

Sathanur Reservoir Project Stage-I

This is one of the two reservoir created in the South Pennar valley. This reservoir having storage capacity of 228.91 Mcum provides benefits to the extent of 9,712 ha. under LBC and 8,498 ha in under RBC.

Krishnagiri Reservoir Project

This is a reservoir of capacity 66.10 M cum formed on river Ponnair near Krishnagiri town in Dharmapuri district and provides irrigation benefits to 3643 ha. of land in Krishnagiri taluka.

Araniar Project

Araniar is a very small river taking its source in Andhra Pradesh and entering Tamil Nadu to flow into the Bay of Bengal. Irrigation from this river has been through a diversion anicut called the Surattapalli anicut from which the canal carried the flood flows to fill in a number of tanks, irrigating about 6,883 ha (17,000 ac). To stabilise this and to provide irrigation for another 2,456 ha below the dam, a reservoir was constructed near Pichattur in 1956. With the reorganization of states in 1956, this reservoir has now been transferred to Andhra Pradesh and is maintained by that state.

Parunchani Reservoirs

This reservoir under construction on the Palayar arm of the Kothayar river system in the Kanyakumari district is to augment the storage for the stabilization of the ayacut in Kothayar System which got transferred to Tamil Nadu when Kanyakumari district was formed after the States reorganisation of 1956. This reservoir has been detailed in previous chapter.

SECOND FIVE-YEAR PLAN (1956-57 to 1960-61)

New Kattalai High Level Canal.

The farmers of Tiruchirapalli district were representing for a long time for provision of irrigation facilities for the dry areas, which were not commanded by the river channels. After investigating several alternatives, the government sanctioned a scheme for excavation of a canal from the Kattalai bed regulator running adjacent and parallel to the Kattalai High Level Canal having capacity of 24.9 Mcum (881 Mcft) and commanding the area beyond the tail end of the total ayacut of 4,858 ha (12,000 ac) and to provide direct irrigation to an extend of 3,491 ha (8,622 ac) in favourable years. The supplies for direct ayacut under the canal area allowed generally from 1st August and when the storage position at Mettur is at 22.16 Mcum (57.3 TMC) (level 94 ft.) For indirect ayacut, the likely surplus flows at Grand Anicut after meeting the day to day requirements of the delta are diverted on such days when they are available. The total length of the canal is 138.5 km (86 mile) and the designed discharge at the head is 29.67 cumces (1,048 cusecs.) The head sluice consist of 5 vents of 2.74 m x 1.83 m (9 ft x 6 ft), with sill at +97.44 m(+319.70 ft.) The work was completed and commissioned in the year 1959.

Pullambadi Canal

There were persistent representations from farmers in the backward and dry areas of Udayarpalayam taluk for provision of irrigation supplies to their area. After examination of the possibilities and several alternatives, the Government sanctioned a scheme for excavation of a 87 km (54 mile) long contour canal from Upper Anicut to utilise occasional surplus flows in the river Cuavery (on the days available) to feed the tanks in the area as well as some direct ayacut.

The canal takes off from Ayyar river at Upper Anicut just before its infall into river Cauvery. The Head Regulator with the sill at 71.552 m (+234.75 ft.) consists of 5 vents of 3.962 m x 1.672 m (13 ft x 5½ ft). The capacity of the canal at its head is 30.74 cumecs (1,086 cusecs). The Canal has an ayacut of 8,953 ha (22,114 ac) of which 5,378 ha (13,283 ac) are under 37 tanks and the balance 3,577 ha (8,831 ac) are under direct irrigation. The aggregate capacity of the tanks is 19.47 Mcum (688 Mcft.) The supplies for direct ayacut under the canal area allowed generally from 1st August and when the storage position at Mettur is comfortable. For indirect ayacut the likely surplus flows at Grand Anicut after meeting the day to day requirements of the delta are diverted on such days as and when they are available.

The canal was completed and commissioned during the year 1959. Both these canals were taken in this Plan only to draw the flood flows from the river Cauvery as and when the river is in spate and also to draw the river flows generated below Mettur Dam during north east monsoon period. Utilisation under each of these canals is only in the order of about 141.55 Mcum (5 TMC) and their utility is especially important in that they mostly supplement the storage in a number of minor irrigation tanks in the system.

The Vidur Reservoir Project

This is very small storage of 17.1 Mcum (0.604 TMC) created over a small river called Varahanadhi just north of the South Pennar basin. The river however rises in spate some time during the north east monsoon. This dam got breached once in the earth dam portion because of the unprecedented floods carried by Varahanadhi, which could not be discharged fully opened. This project assumes a special significance in that one third of the command lies in the Union Territory of Pondicherry downstream and the regulation is by mutual cooperation.

Neyyar project

The Neyyar dam is constructed in the Kerala state and from its main canal a branch called the Kanyakumari Branch Canal has been excavated in this plan to irrigate 2,348 ha (5,800 ac) with the understanding that a discharge of 3.4 cum (120 cusecs) is to be delivered at the head of this canal in the Kellagode Hedworks to meet the irrigation needs of the command in Tamil Nadu.

Parambikulam Aliyar Project

By far the most prestigeous project executed by Tamil Nadu during the plan period is the Parambikulam Aliyar Project which is a multi valley multi reservoir projects, designed to pool the flows in a few west flowing

Parambikulam Dam

streams, store them in eight reservoirs created in the Periyar, Chalakudy and Bharathpuzha basins, inter-linked through a number of tunnels and finally conveyed across the western ghats to serve the drought prone areas to the east of ghats. This project was possible only because of the mutual cooperation extended by two benefitting states Tamil Nadu and Kerala for the utilisation of the flows generated both in the Tamil Nadu limits and also in Kerala territory but flowing west and getting wasted into the Arabian sea. A number of hydroelectric schemes could be integrated in this net work both in the Tamil Nadu and Kerala and the sharing of the benefits for irrigation and power is through an interstate agreement executed in 1970 and is now being reviewed for renewal.

THIRD FIVE YEAR PLAN (1961-62 to 1965-66)

Improvements to the Palar Anicut

From the Third Five Year Plan the State, had to turn its attention to the rehabilitation of its existing irrigation systems languishing for want of proper maintenance mainly due to lack to fund, with the conviction that since new projects are becoming rarer with not much of water resources to harness, at least rejuvenating and rehabilitation of the existing assets would yield more than the desired results. The construction of Palar Anicut and its performance has been discussed in the previous chapter. The main hurdle in its efficient performance is the heavy silt that accumulates not only at the anicut site but also travels much interior through the 4 channels taking of from the anicut. The blockage with silt reduces the efficiency of diversion of the flood flows in the river and since this river is one, which carries flows for a few days in the year during the north-east monsoon period, the performance of the system becomes dismally poor. In the improvements, certain silt chambers were created in front of the head sluices of the four channels taking off and the channels improved for a short length at the head with the provision of lined inner channel to induce fast drawal. A number of minor irrigation tanks were also improved with repairs or reconstruction of sluices and surplus structures.

These improvements increased the water drawals at the anicut quite satisfactorily. But over the period again since small periodical clearance of the silt is not being done, the performance is coming down.

Sathanur Reservoir Project Stage-II

This is only increasing capacity of the reservoir by converting the spillway into a gated spillway and also providing the necessary gates on the right flank. An extent of 2,024 ha (5,000 ac) could be added to the command in the process.

Gomukhi Reservoir Project.

A small reservoir of 15.86 Mcum (0.560 TMC) capacity was created over Gomukhi, a tributary to Vellar to benefit the area to the extent of 2,024 ha (5,000 ac).

The Chittar Pattanamkal Scheme

Two streams by name Chittar drain in the north western hilly parts of the Kodharyar basin and join the river Kothayar below Pechipara dam. They are quite small tributaries but all the same have water potential. To use their waters and also the surplus water from Pehicarai, a weir called Thirupparappu weir was constructed in 1951 on Kothayar river with a channel taking off on either side to feed a total ayacut 258.30 ha (885 ac)

These streams Chittars also gave facilities for small storages to be built across them and such proposals were mooted even when these parts were with the Travancore State. The Chittar Pattanamkal Scheme was devised to harness further surplusses in the Kodhayar system and create a grid of existing channel systems and new canals so as to irrigate almost the entire commendable extent in the basin and also cover a small extent of 6,882.6 ha.(17,000 ac) the basin in the Radhapuram area of Tirunelveli district. The total area benefited by the scheme is 12,955 ha (32,000 ac) net and 19,028 ha (47,000 ac) gross.

The following works were executed under this scheme at a cost of Rs.7.88 crores taken up in the IIIrd Five Year Plan.

- The FRLs of Pechiparai and Perunchani reservoirs were raised 1.829 m (6 ft.) by providing gates in the surplus weirs which brought an increase in their storage by 23.8 Mcum (840 Mcft) and 16.7 Mcum (590 Mcft) respectively.
- Reservoirs were formed throwing earthen dams across the Chittar I and II with gross capacities of 17.3 Mcum (610 Mcft) and 28.6 Mcum (1009 Mcft) and these reservoirs were linked by excavating an interconnecting channels.
- From the reservoir on Chittar-I, a feeder channel was excavated to link to the Kothayar Left Bank channel in its head reaches with the consequent enlargement and strengthening of this channel including lining.
- From Km 9.72/6.48 (Mile 6/4) of the Kothayar Left Bank Canal, a new channel called Patanamkal channel has been excavated to irrigate 4,049 ha.(10,000 ac) area for double crop.
- The existing Pandhan kal, Thovala channel and Nilappara channels were strengthened and lined to lead to a new channel extended over a length of 33 km (20½ miles) into the drought prone Radhapuram area merley to feed existing tanks.

Of these additional works under this scheme raising the FRL of the existing Pechiparai and Perunchani could provide interesting technical information.

The Pechiparai dam was badly sweating. Dr. J.L. Savages of the U.S.A. who was in India in some other connection was also consulted to rehabilitate this dam. He suggested a grouted zone of cut off using cement grout at about 6 ft from the upstream face. He also suggested that additional construction to strengthen should only be on top and on the downstream face. After considering a few other alternatives including that suggested by Dr. K.L. Rao who was then the Design Member in the Central Water Commission, the following treatment was done.

Grouting was done as suggested by Dr. J.L. Savage. Buttresses of 6.1m (20 ft.) length were provided at 15.23 m (50 ft.) intervals along the rear face of the dam. The top width of the buttress was kept as 0.914 m (3 ft) and given a batter of 1 to 1. Leaving a gap of 1 ft between the old and new masonry, it was filled up with granite chips and grouted later. Dowel bars 25 mm dia were also provided at 0.914 m (3 ft) centres extending into the old masonry and buried in the new masonry with an encasement of 50 mm 2 dia pipe fitted with a threaded cap at the farther end.

In the case of Perunchani Dam, which is a much later constructed (1948-53) in cement mortar the work was simple since it was already designed for an MWL of 1.83 m (6 ft). The crest of the spillway weir was however lowered to carry a 4.57 m (15 ft.) high shutter so as to provide for a higher flood discharging capacity.

All the works in the scheme were completed by 1970-71.

ANNUAL PLAN (1966-67)

Manimukthanadhi Reservoir

This is again a small reservoir of capacity 20.59 Mcum (0.727 TMC) formed on Manimukthanadhi , a tributary of Vellar and provide irrigation benefits for an area of 1619 ha in South Arcot district.

Gatana Reservoir Project and Ramanadhi Reservoir Project.

These two reservoir projects which could only be considered as minor schemes were taken up to harness the flows in the two minor tributaries of the same names to the Tambaraparani river.

ANNUAL PLAN (1967-68)

Modernising Vaigai Channels

This is a scheme for improving the existing irrigation facilities. The river Vaigai carries floods only during the north east monsoon period and the flow is very undependable. But, for centuries people having been drawing this Vaigai flows through several open head channels on either bank to be stored in the minor irrigation tanks situated in the interior which has been the succour for the farmers of the drought prone Ramanathapuram district.

In this scheme, two regulators were built on river Vaigai one at Viraghanur 5 km downstream of Madurai City and another at Parthibanur further 55 km downstream near the Parthibanur town and two feeder channels excavated one on each flank under each of these regulators suitably linked to the opened head feeder channels already existing. These regulators help in regulating and apportioning the flows released from Vaigai reservoir periodically among all the existing open head channels. This scheme is a good improvement for regulation of Vaigai flow. But the new channels excavated on the banks often suffered breaches when the Vaigai carried unprecedented high floods.

FOURTH FIVE YEAR PLAN (1969-70 to 1973-74)

Chinnar Reservoir Project

In this a small reservoir has been created on Chinnar, a tributary of Cauvery in the Tamil Nadu territory joining Cauvery above Mettur dam. Lying in the folds of the eastern ghats it provides irrigation for just 797.6 ha (1,970 ac) in the dry drought prone district of Dharmapuri.

Thandarai Anicut

This is just a diversion scheme of constructing anicut across Cheyyar, a tributary of river Palar providing irrigation for 569 ha (1,400 ac) new and stabilising an ayacut of 2,486 ha (6,140 ac) under the minor irrigation tanks.

Restoration of Nandan Channel.

This is very minor scheme for deepening the silted Nandan channel and improving its carrying capacity to feed just 133 ha (280 ac) besides stabilisation 2,012 ha (4,970 ac).

It is clear from the nature of schemes being projected in the later Five Year Plans as to how difficult it has become to formulate new surface irrigation schemes in Tamil Nadu state owing to poor water resources.

Marudhanadhi Reservoir Project.

The Marudhanadhi a tributary of Vaigai river has been bounded to create a small reservoir to irrigate 1,507 ha (3,722 ac) area.

Karuppanadhi Reservoir Project :

Karuppanadhi, a tributary of Tambaraparani river in Tenkasi taluk near the famous Cortallam falls has been bunded across to create a storage of just 5.24 Mcum (0.185 TMC) the cost of the project was Rs. 273.50 lakhs to stabilize the ayacut under the existing anicuts and channels on this stream.

Ponnaniar Reservoir Project

Under this project a small reservoir of 3.40 Mcum (0.12 TMC) capacity has been formed on the tributary of Cauvery in Tiruchirapalli district to benefit an area of 741 ha (1,830 ac).

Pilauvkkal Scheme

Under this scheme two reservoirs have been formed on two streams called Periyar and Kovilar tributary of Vaippar which lies in Kamraj district to irrigate an area of 532 ha.

Kodaganar Reservoir Project

A dam was built across Kodaganar, a tributary to Amaravathy, tributary of Cauvery with a masonry regulator in the river bed to discharge a flood of 1273.95 cumecs (45,000 cusecs) flanked by earth dam on either flank. A new ayacut of 2,227 ha (5,500 ac) was to be irrigated under the scheme in Madurai and Tiruchi districts. Unfortunately by the time the canal system got ready a very heavy unprecedented flood estimated at about 3 lakh cusecs occurred due to a cloud burst in the Palani hills on 12th November 1977 which submerged the entire area and breached the dam. Reconstruction has been taken up and completed now.

Parappalar Reservoir Project

This is also another dam constructed across Parappalar, minor tributary of Amaravathy, in the Cauvery basin. The small reservoir of capacity 5.6 Mcum has been formed which does not have any new direct ayacut but only serves as a small storage to stabilise the existing ayacut under small anicut system downstream.

The Second Irrigation Commission (1972)

The Government of India in the Ministry of Irrigation and Power set up the Second Irrigation Commission in 1969 under the Chairmanship of Shri Ajit Prasad Jain, Member of Parliament, with Irrigation Engineers, Commissioner of Agriculture among the five Members and an officer on Special Duty in the Ministry as Secretary, Tamil Nadu has the pleasure of having one of its retired Irrigation Chief Engineer nominated as one of the Member.

Recording the fast development of irrigation in the country since the first irrigation Commission has made its report in 1903, the Government thought it necessary to appoint a Commission to go into all aspects of irrigation expansion in future and detailed the terms of reference as follows.

(i) To review the development of irrigation in India since 1903, when the last Irrigation Commission submitted its recommendations, and report on the contribution made by irrigation to increasing the productivity of land, and in providing insurance against the vagaries of rainfall.

(ii) To examine in detail the irrigation facilities available in chronically drought affected and flood deficit areas and suggest essential and minimum irrigation works to be undertaken promptly in such areas.

(iii) To draw us a broad outline of development of irrigation of all types, for achieving self-sufficiency in cereals, and for maximizing the production of other crops, and to make a broad assessment of the funds required for the purpose.

(iv) To examine the adequacy of water supply in major irrigation project.

(v) To examine the administrative and organisational setup for the planning, execution and operation of irrigation works, particularly with a view to the speedy completion of project, and reduction of their gestation period.

(vi) To suggest criteria for the sanctioning of irrigation projects and

(vii) To examine any other matter incidental or related to other development of irrigation in the country, and make suitable recommendation.

The Commission after extensive studies and discussion presented its report in 1972 in four volumes. They have given a detailed review of the progress in irrigation statewise and also river basin wise, suggested a few policy decisions for future development, discussed on the special considerations to be given to the drought affected areas, waterlogged and flood affected areas, stressed on the economics and financing irrigation works, the need for enacting Irrigation Laws and Codes, organising research and training and maintenance of reliable statistics.

In respect of the Tamil Nadu state, the report admits that agriculture is the predominant occupation in the State and rice is the principle crop. The yield is seen to be higher than the country's average in respect of principle crops.

The river Cauvery is credited to be one of the best regulated and fully exploited to be one of in India and the usefulness of the storage at Mettur for Delta Irrigation and the existence of the 2000 year old Grand Anicut are talked about.

The Commission also mentions that having practically exhausted the available surface water resources the only hope is in diverting waters through the western ghats from Kerala where undoubtedly large proportion of waters of west flowing river was going to waste. The Commission suggests that the state of Tamil Nadu may have to take this issue with the state of Kerala.

The Commission also suggests adequate powers being vested with irrigation engineers to prevent unauthorized irrigation and calls for hiking the water rates to reduce excessive use of water for crops and lead to better management.

FIFTH FIVE YEAR PLAN (1974-75 to 1978-79)

Improvement to Periyar System

Started initially as a modest modernisation scheme to effect certain improvements in the century old Periyar irrigation system and thereby increase the ayacut for which there was great demand through effecting savings on water use, it soon attracted the attention of the World Bank. For the first time the Planning Commission, Government of India conveyed their acceptance to formulate the scheme for enlargement of ayacut to an extent of 7409 ha.(18,300 ac) to be served out of the savings in water use to be brought about by lining the conveyance channels and through providing a link canal between the Vaigai reservoir and the Peranai Regulator from where the ayacut under the Periyar system starts, thus reducing the river losses in this stretch. On the recommendation of the Planning Commission the Ministry of Irrigation, Government of India also referred this to the World Bank for external assistance. The pre-appraisal team of the World Bank visited the project area on the 20th and 21st of August 1975, and thereafter, a number of visits of experts from the World Bank, the Bank conveyed their decision in May 1977 to fund this project to be renamed as "Modernisation of the Periyar Vaigai Irrigation System" with larger investments and larger benefits. The Bank also conveyed that they consider this as a pilot project on modernisation in the country and hence had special interest in its progress and achievements.

Under this project implemented in two stages between 1977 and 1989, the entire Periyar Vaigai System including the extensions provided through various limbs was totally lined for the designed sections up to the 10 hectare limit. The total investment is Rs.70 crores and the total extent under the system now stands at 81,069 ha (2,00,241 ac) as against the old ayacut of 63,243 ha (1,56,210 ac) all with the hope of realising a savings of 188 M cum (6.63 TMC) in the water use though the modernisation. The system is now functioning extraordinarily well, with fast coverage and minimum conveyance losses.

Varattupallam 'Reservoir Scheme

Varattupallam is a small stream joining Bhavani, tributary of Cauvery which brings inflows during the north east monsoon. The small reservoir created on the stream through this project serves an areas of 676 ha (1670 ac) in Bhavani taluk.

Sathanur Right Bank Canal Project

The Reservoir capacity was increased in the scheme taken up in the III-Five Year Plan and the new command was localised only in the right flank through a main canal on contour taking-off from a pick up anicut just 8 km downstream which also formed a part of the project. In this V- Five Year Plan, excavation of a right main canal was done taking off from the same pick up anicut to irrigate an additional 3,644 ha (9,000 ac) mostly for dry cropping besides stabilising the 1,215 ha (3,100 ac) already existing under minor irrigation tanks. This large command is managed by staggering the irrigation issues depending upon the storage that is built up in the Sathanur Reservoir.

Gunderipallam Reservoir

Gunderipallam is another stream joining Bhavani, a tributary of Cauvery. A small reservoir of 3.06 Mcum (0.108 TMC) capacity has been formed on this stream to hold the flows generated mainly in the north east monsoon period to serve an ayacut of 462 ha (1140 ac).

Gundar Reservoir Project

This minor reservoir has been formed on Gundar, a minor tributary of Tambaraparani more as a storage to stabilise the existing ayacut and with no ayacut of its own. The reservoir besides stabilising the existing ayacut helps to convert 39.66 ha of single crop area to double crop. There is no separate canal.

Vattamalaikarai Odai Reservoir Project

As the name implies it is just a small drain finally joining the Amaravathy river in Cauvery basin. The Reservoir formed is to serve an ayacut of 2,347 ha (5,797 ac).

Vardhamanadhi Reservoir Project

This is a typical reservoir with no new ayacut to be served and is meant to be only a small storage to stabilise the ayacut under a few diversion anicut on the Vardhamanadhi, a tributary of Amaravathy. This small reservoir is located in picturesque surroundings very close to the temple town of Palani Lord Muruga's abode on top of hill. There is no canal taking off from the reservoir. The project mainly contemplates stabilisation of existing ayacut and bridging the gap.

ANNUAL PLAN (1978-79)

1. P. T. Rajan Channel

The Cumbam Valley through which the Periyar waters flow into the Suriliyar tributary of Vaigai is seemingly very fertile with more than 6,073 ha (15,000 ac) irrigated from the anicuts and channels. Except for the narrow strip of this fertile land the rest are dry-tracts. This P.T. Rajan channel was excavated to extend irrigation for another 680 ha (1,680 ac) in these dry lands.

SIXTH FIVE YEAR PLAN (1980-81 to 1984-85)

Thumbalahalli

Palacode area in Dharmapuri district is drought prone. By way of creating irrigation facility to at least a small extent of about 900 ha, the stream Thumbalahalli, a minor tributary of river Pennayar was bunded by an earth dam to create a storage of capacity of 3.68 Mcum to provide and irrigation to the area 883.85 ha in Dharamapuri district.

Pambar Reservoir

Pambar another minor tributary of the Ponnaiyar river was also bunded to create a storage capacity of 7.93 M cum of creating irrigation potential of 1618.78 ha in the drought prone areas in the basin in the Dharmapuri district. In fact this project was funded from the Drought Prone Area Programme.

Vembakottai Reservoir Project

This medium irrigation project was taken up to create irrigation potential in another proverbially drought prone district of Ramanathapuram (before trifurcation). Vaippar is the river on which this reservoir has been formed for storage capacity of 11.29 Mcum to provide irrigation to the area of 3279 ha in Kamarajar district .

Kullur Sandhai Project

This minor Irrigation Project was taken up in the same Vaippar basin a little downstream for a storage capacity of 3.59 M cum to create irrigation potential in Aruppukottai taluk of 1034 ha. In Kamarajar district. Though a very minor work, it cost a lot and took long time to build because of the poor soil conditions in the area

Ichambadi Anicut Scheme

This medium irrigation scheme was conceived and executed in the Pennaiyar basin as a diversion scheme in the upper reaches to benefit 2530 ha (6249 ac) through supplementation of tanks and also direct irrigation. The river bed being mostly rocky the anicut construction gave no unsurmountable problems.

Sulagiri Chinnar Reservoir Scheme

This minor reservoir was built across the tributary Chinnar of Ponnaiyar river in its upper reaches. Located in picturesque surroundings in the folds of the eastern-ghats in the Hosur taluk of the Dharmapuri district. It serves an area of 705 ha (1741 ac) only.

Thoppiar Reservoir Scheme

Thoppiar a minor tributary of the river Cauvery is bunded across by an earth dam with a flood regulator to create a storage capacity of 8.456 Mcum to feed an ayacut of 2157 ha (5328 ac) in the Omalur and Mettur taluks of the Salem District.

Siddhamalli Reservoir Scheme

A long earth dam has been built across the Siddhamalli stream in the Trichy district which joins Coleroon to create a minor reservoir and feed a new ayacut of 1700 ha (4200 ac). The black soil in the area posed several problems in the formation of the earth bund though it was only low and the foundation for the flood regulator in the river bed had to be deigned as a ribbed inverted RCC raft.

Nagavathi Reservoir Project

A small storage of 4.65 Mcum has been created on Nagavathi, a minor tributary of Cauvery in Dharmapuri district. A special feature of this scheme is the ingenerous way the ungated over flow weir has been built for the surplus on the right end with a side channel to lead the spill towards the river downstream culminating in a stilling basin with a roller type baffle wall to induce rolling waves to dissipate the energy. This schemes provide irrigation benefits to an area of 806.556 ha. in Dharmapuri Taluk of Dharmapuri district.

Kesarigulihalla Reservoir

This is again a very small reservoir of 3.80 Mcum (0.134 TMC) capacity created on a minor drain joining Cauvery in Dharmapuri district. This scheme provides irrigation benefits to an area of 1618.78 ha in Palacode of Dharmapuri district.

Noyyal Reservoir Project

Noyyal, a tributary of river Cauvery starts as a small drain to the west of Coimbatore City and flows down through Periyar district to join the river Cauvery on its right near Kodumudi town. A small reservoir of 17.44 Mcum (0.616 TMC) capacity is formed with an earthen bund across to feed an ayacut of 4,212 ha (10,400 ac) dry in the Periyar district.

Downstream of this, in the Tiruchi district a barrage has been built before its confluence with Cauvery to lead the flood flows to be stored in a tank formed inland of 6.65 Mcum (0.235 TMC) capacity to feed an ayacut of 3,886 ha (9,600 ac).

Noyyal draining the low rainfall tract is thus tapped not only by a number of small anicuts in the upper reaches which are old but is also now provided with a diversion barrage to utilise the flood waters that may flow once in a way. This is indicative of the attempts of the state to utilise even small flows that are available in its streams though not that dependable.

Upper Reservoir

Upper is a small drain joining the Coleroon arm of Cauvery on its left. A small reservoir of 2.26 M cum (0.080 TMC) has been formed in the Lalgudi taluk of Trichy district, to provide irrigation benefit to an area of 722.4 ha.

Kuthirayar Reservoir Scheme

Kuthirayar is minor tributary of Amaravathy a tributary of Cauvery and this has been bunded across to form a reservoir of 7.16 Mcum (0.253 TMC) capacity to feed an ayacut of just 1,499 ha (3,700 ac) to benefit the dry areas in Dindugal district.

Perumpallam Reservoir

Perumpallam as the name itself implies is just a drain joining the Bhavani tributary on its left just as the Varattupallam and Gunderipallam. A reservoir of 3.29 Mcum (0.116 TMC) capacity has been formed on this in Periyar district to feed 1,053 ha (2,600 ac) by throwing an earthen bund on the same.

Anaimaduvu and Kariakoil scheme

These two small reservoir schemes were also taken up to create storages on these two tributaries in the Ponnaiyar basin in Salem district to irrigate 1,810 ha and 2,660 ha respectively.

Anaikuttam and Golwarpatti Schemes

Similarly these two small reservoir schemes were also taken up in the Vaippar basin in the Ramanathapuram district to create potential of 1,820 ha and 2,660 ha respectively.

Most of the schemes taken up under the VIth Five Year Plan spilled over to the VIIth Five Year Plan and also to the Annual Plans thereafter and there were no worthwhile new schemes taken up during this period.

SEVENTH FIVE YEAR PLAN (1985-86 to 1989-90)

National Water Management Project.

This project was taken-up with World Bank aid. This is essentially, a project to rehabilitate the old irrigation systems in the river basin with proper repairs and improvements and introduce better management practices. The following seven sub projects were identified and taken up which spilled over to the VIII-Five Year Plan. Through this better management, an extent of 1,53,146 ha (3,78,271 ac) of the existing ayacut, under these systems would get the benefit.

1) Sathanur Sub Project
2) Kothayar Sub Project
3) Thambaraparani Sub Project
4) Cumbum Valley Sub Project
5) Amaravathy Sub Project
6) Sethiathope Sub Project
7) Marudhanadhi Sub Project

The Kelvarapalli Reservoir Project

Under this scheme a reservoir of 13.62 Mcum (0.481TMC) capacity is formed across Ponnaiyar in its heads reaches in Hosur taluk of Dharmapuri district to benefit an area of 3,238 ha (7,998 ac) mostly for dry crop irrigation. An essential feature of this scheme is the allocation of 6 Mgd from its storage for the Hosur township, way side villages and the Small Industries Promotion Corporation of Tamil Nadu (SIPCOT) Complex that has been developed in Hosur town which has now grown very well. This project had a chequered history in its having been kept suspended for more than six years due to litigation in land acquisition and could finally be completed only during this plan.

Parambikulam Aliyar Project (Ayacut Extension Scheme)

This is a major scheme started even in the VI-Five Year Plan substantially completed in the Seventh and is spilling into the VIII-Five Year Plan as well. The unique features of the Parambikulam Aliyar Project have already been described above under the II-Five Year Plan, while the headworks were completed and the benefits started flowing to the ayacut of 1,01,215 ha (2,50,000 ac). More and more demands for extension of the ayacut under this scheme came up from several drought prone areas in the neighbourhood but within its command. The Government had to yield to the pressures seeing the due need for water even for drinking and domestic uses besides for cultivating dry crops and sanctioned extensions in three stages totaling to 70,540 ha (1,75,000 ac) in the following taluks.

Taluk	**Districts**	**Extension provided**	
		ha	(ac)
Pollachi	Coimbatore	10,449	25,800
Udumalpet	Coimbatore	14,459	35,700
Palladam	Coimbatore	11,624	28,700
Dharapuram	Periyar	34,008	84,000
	Total	**70,540**	**1,75,000**

This led to a very interesting ingenious solution in management. After a lot of persuasion and going through several legal hurdles, the Government have now succeeded in convincing the people in the command to be satisfied with irrigation supply once in two years. The entire command of 1,72,065 ha (4,25,000 ac) have been divided into four zones and supply is given in for different seasons in two years mostly for raising dry crops.

ANNUAL PLANS (1990-91 and 1991-92)

Only two minor schemes by name Chinnavedamatty tank scheme and Chennanpatti anicut schemes could be started in these plan periods. A high level canal was excavated from the surplus weir of the ancient Maduranthakam tank in Chingleput district which is one of the major tank in the state with its own ayacut of more than 1,134 ha (2,800 ac). This high level canal now excavated is expected to lead only surpluses from the tank to feed a few tanks lower down and benefit an area of 211 ha (520 ac).

EIGHTH FIVE YEAR PLAN (1992-93 to 1996-97)

Nanganjiar Reservoir Scheme.

This scheme contemplates formation of a reservoir of 582 Mcum capacity on Nanganjiar river near Idayankotai village in Palani taluk at an estimates cost of Rs.2070 lakhs. The benefit envisaged is the additional ayacut of 2,529 ha. (6,247 ac)

Irukkankudi Reservoir Scheme.

A reservoir of 141.4 Mcum (499.5 Mcft) is proposed across Vaippar near Irukkangudi Village of Sattur taluk of Kamarajar district. The new acyacut will be 3,707 ha. (9,156 ac) besides stabilising the existing ayacut below. Both of the Scheme are in Progress.

6.4 Dam Safety Assurance and Rehabilitation Project : Dam Safety Assurance and Rehabilitation Project has been taken up for implementation during 1991 and the Administrative Sanction for the project has been issued by the Government during April 1992 The project consists of the following three components

1. Institutional Strengthening
2. Providing Basic Safety Facilities
3. Remedial Works.

1. Institutional Strengthening Dam Safety Directorate has been established during November, 1991 to monitor the progress of the works and to review the safety of dams in the state.

2. Providing Basic Safety Facilities Originally fourteen dams have been identified for providing Basic Safety Facilities viz. (1) Access Road (2) Backup Power (3) Instrumentation (4) Communication Facility. Subsequently four dams have been included for providing basic facilities. In eight dams the access road has been completed, for five dams generators have been procured and for nine dams weather station instruments have been procured. It is proposed to procure and install additional generator for four dams, access road in six dams, seismic instrument in one dam, automatic water level recorder in 16 dams and peizometers in 14 dams. The work of establishing communication facilities in the State, entrusted to Messrs. Bharath Electronics Limited., Bangalore,. H.F. & V.H. equipment are supplied and the installation of equipment, repeater stations are under progress.

3. Remedial Works Originally nine dams have been identified for rehabilitation and subsequently five dams have been included for remedial works such as providing additional spillway, fuse plug, wave deflector, parapet wall and rehabilitation for earth darm. They are in various stages of progress.

1. Periyar Dam
2. Kodaganar Dam
3. Manimuthar Dam
4. Pechiparai Dam
5. Gomukhi Dam.

6.5 Development under Minor Irrigation through Surface Water use : The development in the Minor Irrigation Sector in the pre British period has been discussed in good detail in the earlier chapters. With thousands of minor irrigation tanks and tank systems created over centuries and millions of dug wells that have been constructed by beneficiaries and in use, there was very little scope left for large-scale development to be undertaken during the Plan periods. However, a few programmes were carried out during the successive Plan periods and further utilisation of both surface and ground water.

1. Special Minor Irrigation Programme (SMIP)

Wherever there was a feasibility of harvesting the rainwater and holding the run off a few new tanks were created under this programme which added to the irrigated area to a small extent.

2. Accelerated Minor Irrigation Programme (AMIP)

In this, the existing minor irrigation sources were rejuvenated and brought to good shape which incidentally helped in adding a little bit of new area or area that was not served earlier under irrigation.

3. Ex-Zamin Tanks

With the abolition of the Zamindar System in 1958, those areas which are under the direct administration, it was seen that thousands of minor irrigation sources in those ex-zamin, areas were in a large state of distress. Under this special programme those minor irrigation tanks and other sources were brought to standards through investments of plan funds added on to the main stream of other minor irrigation sources in the state.

4. Desilting-cum-Reclamation Programme (DCR)

In many of the tanks the capacity has come down due to silting and sedimentation, with result there was shortfall in the ayacut area that could be served by these tanks, therefore, Desilting-cum-Reclamation Programme (DCR) were undertaken in Tamil Nadu State. Desilting is a costly process and is not advised. Instead, raising of the Full Tank Level (FTL) by about 20 cm or 30 cm in some cases was proposed which compensated for the lost capacity and desilting was done to the extent of raising the foreshore lands that would go under submersion with the raised FTL and to some extent to strengthen the tank bunds.

Some of the earth moving machinery, which got released after completion of the major and medium structures were deployed for this programme with advantage.

5. Modernisation of Minor Irrigation Tanks with the European Economic Community Fund

Obsessed with the excellent features of the tank irrigation systems in the state and lamenting over the way they are languishing for want of adequate funds for keeping them in good repair, the EEC came forward with the fund assistance for their rehabilitation under this programme which started in 1981 and is being implemented

in two stages. As many as 552 tanks have been brought to standards so far and an expenditure of Rs.146625 lakhs have been incurred. Tanks with command areas of less than 200 ha are selected in the different districts, their physical features like the bund and the structures are improved and brought to standard. Special attention is paid to the distribution system also, and by lining the distribution channels fast coverage of the command by speedy transmission and avoiding of excessive seepage losses could be achieved. More than this, under this programme better management of the storage is planned through a modification of the existing procedures wherever necessary. Water Users Association was entrusted with the modernisation of some of the above tanks and it is new concept for involving the farmers participation in execution of works and turn over to Water Users Associations for future maintenance.

6. State Tank Irrigation Project (STIP)

This Project was launched in 1995 for the standardisation of Minor Irrigation Tanks.

6.6 Minor Irrigation Development through Groundwater use : It is in the ground water use that Tamil Nadu State recorded phenomenal development after independence. Even though nearly 73% of the States geographical area is with hard rock strata, covering the western and central parts, the development of the techniques in drilling has triggered the process of increasing the bore-wells all over. Adding on to this the policy of the Government to expeditiously extend power supply to rural areas in the sixties has facilitated the lifting of water from greater depths. The cost of power for rural agricultural pumps has always been heavily subsidized and in the eighties the power supply to agricultural pump sets has been made completely free. Though this has given a flip to the farmers to go in for more and more bore holes and pump sets and increase the agricultural out put, this is entailing a large amount of loss to the exchequer and the Tamil Nadu Electricity Board (TNEB), is all the time concerned about this development. Yet it is the gift of the popular Government of the day, which they are unable to reverse.

In fact the ground water use has increased to such a large extent in such a short time that the exploitation is bordering on mining. Areas under the dark blocks is increasing warning that the ground water recharge will not admit of any further increase in the bore holes in the area.

Specifications on inter-space between bore-holes are strictly observed in cases where the beneficiary come for loan assistance from banks and other Government institutions. But those beneficiaries who invest on their own go scot-free and unless some sort of self regulation is observed, this trend of over exploitation is likely to lead to disaster. Several attempts to bring in "Ground Water Regulation Act" have not borne fruit.

In the sedimentary formations available in the coastal pains and the alluvial areas, groundwater available is being tapped through filter points, and deep tube wells sunk with the special type of drills. There is also a tendency to over exploit and the ground water table shows a lowering trend.

The status of ground water development is categorized over exploited, dark, grey and white. Where exploitation is more than 85% of but less than 100% it is classified as dark areas and where it is more than 65% but less than 85% it is said as grey, and where it is less than 65% utilisation as white. If the exploitation is greater than 100 % the area is classified as over exploited areas.

A recent compilation of the status of ground water, made block wise shows as below:

Table 6.1 : Status of Groundwater Exploitation

Sl. No.	District	Over Exploited Blocks (>100%)	Dark Blocks (100 to 85%)
1.	Chenganpet-MGR	1. R.K. Pet 2. Poondi 3. Minjur 4. Thiruvalangadu 5. Thiruvallur 6. Madhavaram	1. Sholavaram
2.	North Arcot-Ambedkar	1. Kanniyampadi 2. K.V, Kuppam 3. Madanur 4. Thirupattur 5. Villore	1. Anaicut
3.	Thiruvannamalal Sambuvarayar	1. Chengam	
4.	South Arcot	1. Koliyanur 2. Thiruvennainallur 3. Kandamangalam 4. Nellikuppam 5. Vikravandi 6. Keerapalayam 7. Ulundurpet 8. Thiurnavalur	1. Gingee 2. Vallam
5.	Salem	1. Konganapuram 2. Mallasamudram 3. Attur 4. Rasipuram 5. Vennandur 6. Paramathi Velur 7. P.W. Palayam 8. Erumaipatti 9. Namagiripettai 10. Mohanur	1. Omalur 2. Kabilarmalai 3. Elachipalayam 4. Gangavalli 5. Valapadi 6. Panamarathupatti 7. Puduchatram 8. Senthamangalam
6.	Periyar	1. Modakurichi 2. T.N. Palayam 3. Nambiyur 4. Andhiyur 5. Bhavani Sagar 6. Kodumudi	1.Erode 2.Uthukuli 3.Chennimalai
7.	Coimbatore	1. Palladam 2. Sulur 3. Annur 4. Tiruppur 5. Avinashi 6. Madukkarai 7. Sultanpet 8. Pongalur	1. Pollachi (N) 2. Thondamuthur 3. Gudimangalam

8.	Dharmapuri	1. Palacode 2. Bargur 3. Mathur 4. Krishnagiri 5. Haruir	1. Dharmapuri 2. Pappireddipatti
9.	Tiruchirapalli	—	1. Kulithalai
10.	Thanjavur	1. Papanasam 2. Kumbakonam 3. Thiruvidaimurdur 4. Thiruppanandal 1. Thiruvalyar	
11	Nagapattinam Quaid-e-Milleth	1. Mayiladudurai 2. Kuttalam 3. Kollidam 4. Sirkali 5. Sembanarkoil 6. Needamangalam	1. Nannilam 2. Koradachery
12	Madurai	1. Theni 2. Chinnamanur	1. Usilampatti 2. T. Kallupatti
13	Dindigul-Anna	1. Reddiyarchatram 2. Vadipatti 3. Alanganallur	1. Vattalagundu
14.	Kamarajar	—	1. Rajapalayam
15.	Tirunelveli-Kattabomman	—	1. Alangulam 2. Melaneelithanallur
16.	V.O. Chidambaranar	—	1. Vilathikulam 2. Udangudi 3. Sathankulam

Abstract

No. of Distt.	Total No. of Blocks	Over Exploited Blocks	Dark Blocks
21	384	54	43

Source : Groundwater resources of India, GGWB, MOWR, 1995.

More and more blocks becoming over exploited and dark, is a matter of concern. It is well known that particularly in the north-western area in the districts of Salem, over expterted and Periyar and Coimbatore the ground water table has gone down below 70 to 100 *m*.

The state under the advice of the Central Ground Water Board undertake assessment of groundwater potential. In recent year block wise assessment has also been attempted. As per assessment made in January, 1993 the utilisable ground waters recharge is as below. :

Groundwater recharge	26,39,125 ham
Utilisable groundwater recharge	22,43,256 ham (792 TMC)
Net groundwater draft	13,55,773 ham
Balance groundwater available	8,87,483 ham
Groundwater Development	60% (The projected figure for 1997 is 63%)

Having almost exhausted the surface water potential the only hope for any further irrigation development is in the use of this balance ground water potential by a careful controlled operation. This is clear from the following table.

Table 6.2 : Status of Irrigation Potential Created in Tamil Nadu from Surface and Groundwater

(unit -Mham)

Source of Irrigation	Ultimate Potential Assessed	Potential Created	Balance Potential	%
Major and medium projects	1.50	1.49	0.01	99
Minor Irrigation: Surface Water	1.20	0.91	0.29	76
Groundwater	3.35	2.00	1.35	60
Total	6.05	4.40	1.65	73

The statement showing the development of wells during the past years from 1980-81 to 1994-95 and the number of wells energised are shown in Table 6.3 respectively. During August, 1997, it is reported that 15,82,000 wells have been energised.

Table 6.3 : Development of Wells during the period 1980-95

Sr.	Agriculture year	Tube wells	Filter point tube wells	Dug wells	Dugcum bore wells	Other types of wells	Total	*Energised wells
1	1980-81	40980	12336	1590011	22264	1923	1667514	NA
2	1981-82	45144	11831	1600437	23237	2312	1682961	NA
3	1982-83	49381	12097	1613334	23560	2450	1700822	NA
4	1983-84	52845	10262	1629024	11137	1982	1705250	NA
5	1984-85	48489	10262	1647380	7495	2534	1735673	NA
6	1985-86	46952	15951	1662685	7967	2118	1746892	NA
7	1986-87	49769	11574	1675649	7779	2121	1726869	NA
8	1987-88	73291	8819	1637727	6528	504	1741377	1184000
9	1988-89	77751	9464	1645497	8525	140	1744567	1236000
10	1989-90	77910	8565	1650299	7653	140	1770196	1277000
11	1990-91	74824	14923	1672680	7715	54	1781428	1319000
12	1991-92	81299	17676	1674688	7765	Nil	1781428	1360000
13	1992-93	86018	22324	1678930	7733	376	1795381	1404000
14	1993-94	86881	22815	1679261	8775	418	1798150	1446000
15	1994-95	93957	30256	1706434	8854	253	1839754	1488000

Source : Season and Crop Report of Tamil Nadu 1993-94 by Directorate of Economics and Statistics, Chennai.

* Tamil Nadu Electricity Board, Chennai- 2

Tamil Nadu state has long realised that there is need for effecting economy in the use of waters in irrigation in the interest of sustaining the present irrigation development and aim for marginal increase through water conservation and savings in waters use.

Installation of sprinkler and drip irrigation system is being popularised with large. Barring areas where rice is grown which is of course substantial, these water saving irrigation systems are being tried where dry crops are grown. Of course the initial installation cost is a discouraging factor. This is yet to catch up in a big way. As per the statistics compiled by the Statistics Directorate of the Central Water Commission, Government of India in February 1995, the following is the achievement in minor irrigation in Tamil Nadu State.

Minor Irrigation : Surface Water and Ground Water (Thousand hectares)

Plan Period	Surface water	Groundwater	Total
At the end of VI Plan 1984-85	810.0	1140.0	1950.0
At the end of VII Plan 1985-90	841.7	1216.7	2058.4
At the end of Annual Plan 1990-92	806.7	1247.2	2107.9
At the end of VIII Plan 1992-97 (Target)	880.8	1263.8	2217.9

Statement of net area irrigated by different sources in Tamil Nadu during the period 1950-51 to 1994-95 are furnished in Annex-6.5 It will seen that tank irrigation is coming down in extent while the area irrigated under wells by lift is increasing.

6.7 Research and Training

a) Institute of Hydraulics and Hydrology, Poondi

Tamil Nadu state is a pioneer in organising research in irrigation engineering on scientific lines in the State Sector. The Irrigation Research Station at Poondi, 60 Km from Chennai behind the Sathyamurthisagar, a water supply reservoir for the city of Chennai, was created as early as 1945. This Research Station came in handy to evolve hydraulic design through model experiments for the various components of the hydraulic structure constructed through the Five Year Plan in the State. Besides the home needs, this Station has been providing assistance for designs for the Central Projects like the Kalpakkam Atomic Power Project, Tuticorin Harbour Project, Railway Bridge Projects, Highway Bridge Projects, Hydro Power Projects etc. Well equipped with the necessary static water tanks, hydraulic experiments, the institute gained a special credit for the evolution of a cost effective elegant design for the dissipation arrangements below the Lower Bhavani Dam Spillway which attracted the attention of hydraulic engineers world wide and is being referred to in text books as Poondi design.

Another area where designs were specialised in this institute is the provision of bell mouth entry to the sluices in dam structures and the exit portals of such sluices.

Several basic studies are being undertaken in this institute

(a) Design of ogee shape over-flow spillways, shiphon spillway, open and shuttered type of flood escapes from reservoirs.
(b) Fluming of canal, their inlet transition exit, transitions and raising aqueduct floors at cross drainage.
(c) Infiltration galleries for water supply, their arrangement and disposition of filter material in the galleries.
(d) Evolving high coefficient profiles for adoption in minor tank weirs and anicuts and
(e) Assessing the efficiency of different types of canal lining.
(f) Design of high head gates.

The station was upgraded as the Institute of Hydraulics and Hydrology in 1972.

Since then a lot of activities in the fields of irrigation management, evaporation studies, seepage studies, the sea erosion problems, study of breakwaters, run off from small catchments have sprung up. Several research schemes are being entrusted by the Central Board of Irrigation and Power (CBI&P), the Indian Council of Agricultural Research (ICAR), Central Ground Water Board (CGWB) and others besides the problems arising in the state to this Institute.

With the recent shift from hydraulic modelling to analytical and mathematical modelling, this Institute is catching up with the help of equipment like latest version of computers, remote sensing units. Several problems that arise in the rehabilitation and modernization of the existing irrigation systems area are also being undertaken in this Institute, an example being the siltation problems in the Periyar Canal for the World Bank assisted Modernization of Periyar Vaigai System.

There is a separate unit of the Institute engaged in the survey on study of reservoir siltation by conducting silt survey in the main reservoirs in a cyclic order. With the result of the surveys, suitable recommendations are given for integrated treatment of catchment

This institute has good assets to continuously assist in the development of irrigation in the state both in Construction and Management.

b) Institute for Water Studies (IWS), Chennai

With limited water resource in state and the growing demand for water use, a need was felt for acquisition, storage and retrieval of all data relating to water use in the State to decide on a proper allocation for different uses and with this objective the Institute for water studies was set up in 1974. This Institute is to serve as a min storage centre for all water related data, assist in developing a broad water policy for the State, which has been since done, initiate guidelines for better water management, conduct water balance studies for water depletion and recharge, this Institute is also assessing the impact of over extraction in the different parts of the state. Assisted by UNDP and IDA the Institute is getting strengthened. The Institute has been assigned with the job for preparing river basin plans for the state. They are presently preparing the state framework of Water Resources Plan. Subsequently, the institute will prepare detailed river basin plans for all the river basins in Tamil Nadu. The institute drafted the Tamil Nadu Water Policy in line with the National Water Policy (1997) This institute is the implementing agency for the water policy of Tamil Nadu.

c) Irrigation Management Training Institute (IMTI)

This is the premier Institute for Irrigation Management Training in the State. Established through the financial assistance from the USAID, this Institute is registered under the Registration of Societies Act and is governed by a high level body. Functioning in its well developed campus near Trichy at the head of the Cauvery Delta, this Institute besides organising training programmes for all officials at different levels, irrigation engineers, agricultural engineers, agricultural scientists and others in Tamil Nadu Government Service related to irrigated agriculture, action research programmes are conducted in parts of the Cauvery Delta to continuously evolve solutions for problems encountered in irrigation management. Another commendable function of this Institute is to assist in organising the farmers by forming the farmer's associations. A particular mode of approaching the farmers and successfully organising them into self help groups adopted by this Institute in a village called 'Salipperi' in the Cauvery Delta goes by the name 'Salippperi model' and is being discussed in all forums where the participatory irrigation management is the topic.

Training is extended to irrigation subordinate service personnel and mainly for farmers in their own environment by conducting programming in their villages themselves.

This Institute also organises seminars and symposia with the objective of disseminating knowledge and information on improved methods of irrigation management.

6.8 Tamil Nadu Water Resources Consolidation Project : Tamil Nadu is one of the states which has got a number of very old irrigation systems constructed some decades and centuries, ago but still functioning of course with less efficiency. The irrigation structures and the works in these systems have been long languishing for want of proper maintenance and improvements mostly because of lack of funds. The meagre funds allocated in the budgets are just sufficient to meet the minimum requirements of the systems to run them year after year for irrigation purposes. It has been long felt that some special efforts have got to be taken for improvements of such systems and only in that context modernisation programmes have been launched by this state, three decades back.

Finding that many such systems need some assistance on these lines for rejuvenation and improvements in their efficiency, the World Bank was approached by the Government of India for aid for total improvements of such systems. It is only in this context that the Government of India have launched Water Resources Consolidation Project in a few of the states with the World Bank Aid and Tamil Nadu is one such.

The World Bank after necessary appraisal and detailed examination have approved the project for Tamil Nadu for a total cost of Rs.1,240 crores to be funded under the "International Development Association Credit" and an agreement was entered into with the World Bank during September, 1995 which provides for the following components:

1. Modernisation and Rehabilitation			**Rs.387.20 Cr.**
(a)	**STAGE – I**	Rs.220.98 Cr.	
	1. Cheyyar Anicut System		
	2. Chittar Reservoir System		
	3. Manjalar Reservoir System		
	4. Palar Anicut System		
	5. Parambikulam Aliyar System		
	6. Poiny Anicut System		
	7. Thirukoilur & Ellis Choudry Anicut System		
	8. Tholudur Regulator		
	9. Vaigai Old Ayacut		
	10. Minor Schemes – 27 Nos.		
	STAGE – II	Rs.121.82 Cr.	
	1. Cumbum Valley Project		
	2. Kodayar Reservoir System		
	3. Marudhanadhi Reservoir System		
	4. Sathanur Reservoir System		
	5. Sethiathope Anicut System		
	6. Tambaraparani System		
	7. Periyar Vaigai System		
(b)	Farmers Turn over	Rs.5.30 Cr.	
(c)	Equipment for O&M	Rs.34.50 Cr.	
(d)	Irrigation Management Training Institute	Rs.4.60 Cr.	

2. Scheme Completion Rs.233.09Cr.

1. Adavinainar Koil Reservoir
2. Gridhamal Anicut Scheme near Athikulam village
3. Kodumudiar Reservoir Project
4. Mordhana Reservoir Project
5. Nambiar Reservoir Project
6. Poigaiyar Reservoir Project
7. Rajathopkanar Reservoir Project
8. Sothuparai Reservoir Project
9. Vadakkupachayar Reservoir Project

3. Water Planning, Environment, Management Researc and Land Acquisition (in respect of 9 ongoing Projects) Rs.130.60Cr.

4. Institutional Strengthening Rs. 56.60 Cr

Total **Rs.807.49 Cr**

Through this project, two essential steps are being contemplated (1) to reorganize the department for administrative functioning for better Water Management and (2) to turn over parts of the distribution system to farmers themselves for their management. The first step has been almost achieved with the reorganization of the Irrigation Wing of the P.W.D. as "Water Resource Organization" with the necessary changes in the charges of the Chief Engineers and other cadres below them and they are now functioning in charge of specific river basins for their over all development of water resources. Before the second step could be initiated, the logical sequence could be to get the systems fully restored to a reasonable good physical condition and there after think in terms of turning them over to the farmers who would organize themselves into viable units as Association etc. This second part is yet to be launched. In the mean time improvements to the systems are being taken up.

Since the execution of World Bank Aid schemes are very much involved in procedures and sanctions there is some delay in executing this project and it is hoped that this delay will be made up and the project will be brought to good shape and completed before the year 2001 as scheduled.

6.9 The National Hydrology Project : The Hydrology Project has been taken up at the National level with World Bank Aid and Tamil Nadu is one of the eight states participating in the programme.

The objective of this project is to improve and strengthen the institutional capabilities of the States to measure, collect, transmit, analyse and disseminate all data and information on the parameters of the hydrological cycle in respect of the surface and groundwater resources in the State. The Chief Engineer, Ground Water has been redesignated as the Chief Engineer, State Ground and Surface Water Resources, Data Centre, Water Resources Organisation and at is the officer in charge of this Project.

In respect of the surface water, besides improving the existing 20 stream gauging stations 100 more will be set up and the network will be strengthened with provision of current meter packages, sediment sampling packages and setting 15 water quality and silt analysis laboratories.

In respect of the ground water, besides replacing 110 boreholes now under use, 559 new boreholes will be drilled to 40 m depth in hard rock regions and another 69 tube wells sunk in sedimentary regions to serve as observation wells. Analytical capabilities will be strengthened in the existing three water quality testing laboratories in position in Chennai, Madurai and Thanjavur and one more full-fledged laboratory will be established at Pollachi.

Installation of 150 automatic water level recorders in reservoirs and other storages, establishing computer package in the data processing centres, providing communicating facilities, installing VHFs' offering training for staff are some of the other components of the Project.

The project cost for Tamil Nadu State is estimated at Rs.386.47 million (Rs.38.647 crores) as capital cost, Rs.139.28 million for surface water component and 100.58 million for ground water component.

This project will lead to creation of reliable database acquired and stored on scientific basis to aid precise planning of the water resources for further development. Water quality monitoring will be possible to warn against pollution.

6.10 Administrative Changes in the Irrigation Department : The Public Works Department created in 1858 as the civilian counter-part to the Military Engineering Services (MES) continued to attend to all sectors of engineering works in the then Presidency until it shed the Roads and Highways in 1946 which is now a separate Highways and Rural Works Department, the Public Health Engineering in 1971 when the Tamil Nadu Water Supply and Drainage Board was created. The department continued to serve the irrigation sector and the Government buildings both construction and maintenance. Separation of Irrigation and Buildings was a long felt need.

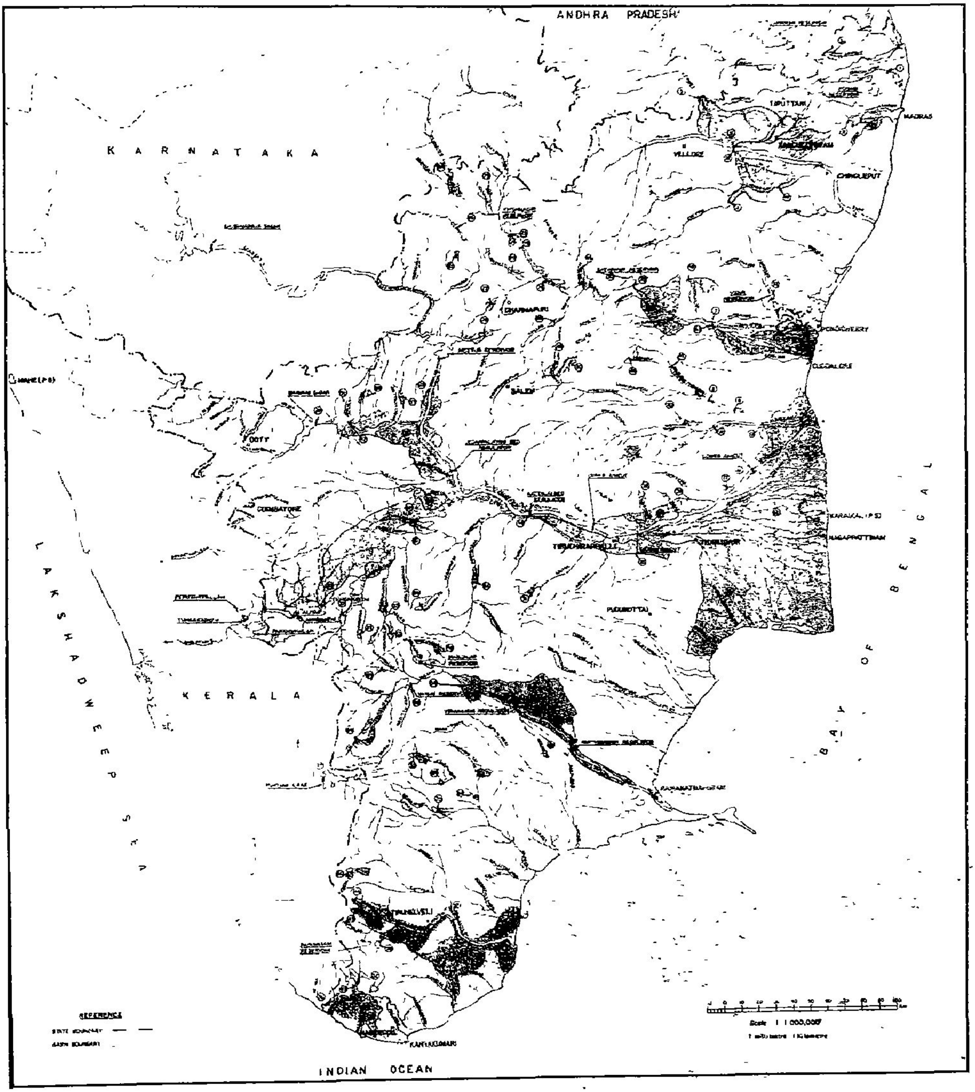
Reorganising this department to exclusively serve the needs of the irrigation which itself demanded a lot of attention for better management, the Water Resources Organisation has been created in 1995 headed by an Engineer in Chief and with regional Chief Engineers in the field who were allocated the overall responsibilities of defined river basins in all aspects of water use in the basins, particularly irrigation use. One Chief Engineer stationed at Madras looks after all river basins north of Cauvery, the second stationed at Trichy takes care of the Cauvery basin; the third is at Madurai for all river basins south of the Cauvery basin. A fourth Chief Engineer stationed at Pollachi looks after the management of the Parambikulam Aliyar Project.

The Engineer-in-Chief, is assisted in the headquarters by three other Chief Engineers one to look to plan formulations, another on research, designs and training and the third to look to the investigation of available ground water and establishment of rain and stream gauges for collection of hydraulic data.

This re-organisation and consequent changes in the administration and accounts to simplify the procedures for speedy execution of works and better management information system has come in handy to execute the major projects like the Water Resources Consolidation Project and the National Hydrology Project.

Map 6.1

Map of Tamil Nadu-Reservoirs and Irrigation Systems



Note : planwise details of projects are given over leaf.

PRE - PLAN PROJECTS		AYACUT IN ha
1	VALLUR ANICUT SYSTEM	2111
2	CHENBARAMBAKKAM TANK	8269
3	PALAR ANICUT SYSTEM	33478
4	CHEYYAR ANICUT SYSTEM	9582
5	POINEY ANICUT SYSTEM	9641
6	LOWER COLEROON ANICUT SYSTEM	53540
7	THIRUKOILUR ANICUT SYSTEM	11331
8	NEMMATHUR ANICUT SYSTEM	12104
9	VIRUDHACHALAM ANICUT SYSTEM	3946
10	WILLINGDON RESERVOIR	11198
11	PELANDURAI ANICUT SYSTEM	6475
12	SETHIATHOPE ANICUT SYSTEM	19465
13	CAUVERY DELTA SYSTEM	367050
14	KATTALAI SCHEME	30878
15	CAUVERY METTUR PROJECT	103600
16	NANDIAR CHANNEL	3231
17	KODIVERY ANICUT SYSTEM	9915
18	KALINGARAYAN ANICUT SYSTEM	5666
19	BARUR TANK SYSTEM	1510
20	PERIYAR SYSTEM	57870
21	MARUDUR ANICUT SYSTEM	8498
22	SRIVAIKUNTAM ANICUT	10522
23	KODAYAR SYSTEM	25900

PLAN PROJECT

FIRST FIVE YEAR PLAN (1951-56)		AYACUT IN ha
24	LOWER BHAVANI PROJECT	83770
25	METTUR CANALS	18211
26	MANIMUTHAR RESERVOIR	8094
27	AMARAVATHI RESERVOIR	8701
28	VAIGAI RESERVOIR	10050
29	KRISHNAGIRI RESERVOIR	3642
30	SATHANUR RESERVOIR - I STAGE	8712
31	ARANIAR RESERVOIR	2455
32	PERUNCHANI RESERVOIR (KODAYAR SYSTEM)	-
SECOND FIVE YEAR PLAN (1956-61)		
33	NEW KATTALAI HIGH LEVEL CANAL	8357
34	PULLAMBADI CANAL	8944
35	VIDUR RESERVOIR	890
36	NEYYAR PROJECT - II STAGE	2347
37	PARAMBIKULAM ALIYAR PROJECT	101981
THIRD FIVE YEAR PLAN (1961-66)		
38	IMPROVEMENTS TO PALAR ANICUT	-
39	SATHANUR RESERVOIR - II STAGE	-
40	GOMUKHI RESERVOIR	2023
41	CHITTAR PATTANAMKAL SCHEME	12950
ANNUAL PLAN (1966-67)		
42	MANIMUKTHANADHI RESERVOIR	1819
43	GATANA RESERVOIR	408
44	RAMANADHI RESERVOIR	202

ANNUAL PLAN (1967-68)		AYACUT IN ha
45	MODERNISING VAIGAI CHANNELS	-
FOURTH FIVE YEAR PLAN (1969-74)		
46	CHINNAR RESERVOIR	757
47	THANDARAI ANICUT	-
48	RESTORATION OF NANDAN CHANNEL	-
49	MARUDHANADHI RESERVOIR	1497
50	KARUPPANADHI RESERVOIR	-
51	PONNANIAR RESERVOIR	741
52	PILAVUKKAL SCHEME	1072
53	KODAGANAR RESERVOIR	2080
54	PARAPPALAR RESERVOIR	406
55	PALAR PORANDALAR RESERVOIR	3885
FIFTH FIVE YEAR PLAN (1974-79)		
56	MODERNISATION OF PERIYAR-VAIGAI IRRIGAION SYSTEM STAGE-1	10305
57	VARATTUPALLAM RESERVOIR	1183
58	EXCAVATION OF RT. SIDE CHANNEL FROM SATHANUR PICK-UP ANICUT	8884
59	GUNDERIPALLAM RESERVOIR	919
60	GUNDAR RESERVOIR	-
61	VATTAMALAIKARAI ODAI SCHEME	1198
62	VARADHAMANADHI RESERVOIR	-
63	RECONSTRUCTION OF THIRUKOILUR ANICUT	-
64	PT RAJAN CHANNEL SCHEME	656
65	PAMBAR RESERVOIR	1619
66	KELAVARAPALLI RESERVOIR	3257

ANNUAL PLAN (1979-80)		AYACUT IN ha
67	P A P AYACUT EXTENSION	58660
68	THUMBALAHALLI RESERVOIR	894
69	VANIAR RESERVOIR	3460
70	VEMBAKOTTAI RESERVOIR	3278
71	KULLURSANDAI RESERVOIR	1034
72	STRENGTHENING OF PERIYAR DAM	-
SIXTH FIVE YEAR PLAN (1980-85)		
73	NAGAVATHI RESERVOIR	807
74	ICHAMBADI ANICUT SCHEME	2529
75	THOPPAIYAR RESERVOIR	2157
76	UPPAR RESERVOIR	723
77	SIDDHAMALLI RESERVOIR	1702
78	REMODELLING OF ANANDANAR CHL.	-
79	SULAGIRI CHINNAR RESERVOIR	353
80	NOYYAL RESERVOIR	3895
81	DIVERSION OF VAIGAI FLOOD FLOWS TO GRIDAMAL & GUNDAR BASINS	-
82	KESARGULIHALLA RESERVOIR	1649
83	EXTN OF R.B.C. THIRUPARAPPU ANICUT	98
84	GOLWARPATTI RESERVOIR	809
85	ANAIMADUVU RESERVOIR	2118
86	ANAIKUTTAM RESERVOIR	607
87	KARIAKOIL RESERVOIR	1214
88	KUDHIRAIYAR RESERVOIR	1477
89	SOTHUPARAI RESERVOIR	406
90	MODERNISATION OF PERIYAR-VAIGAI IRRIGATION SYSTEM STAGE-II	7520
91	PERUMBALLAM RESERVOIR	

CHAPTER 7

FUTURE - PERSPECTIVE

7.1 With the reorganization of the States in 1956, the land area of Tamil Nadu has shrunk to 13.016 Mha, just 4% of the country's geographical extent. The only major river Cauvery draining the state now entangled in disputes on the use of its Waters. The only hope of a little bit of augmentation to the water resources is :

a) The successful implementation of the Peninsular Grid of India through inter-linking the east flowing rivers from Mahanadi downwards upto river Cauvery for trans-basin diversion of waters from surplus basin to deficit basins. Though this has been proposed and initiated as early as 1976, and National Water Development Agency has been created, which is undertaking investigation and studies on interbasin transfer of water. Not even one concrete proposal could be, so far taken up for implementation . Few schemes have been proved to be technically feasible and economically viable water being a State subject, the concerned States may come forward for taking decision in the national interest are politically not in favour of taking decision in the national interest.

b) Diversion of surplus water from the west flowing rivers in Kerala across the ghats towards east may be taken up for implementation. Lot of waters get wasted into the Arabian Sea with the west flowing rivers swelling during the monsoon. Of course the trans-basin schemes in this case could be very costly since long tunnelling in the Western ghats would be involved. All the more, water is precious to Tamil Nadu and even such costly schemes will go through.

Tamil Nadu being in the leeward side of the Western ghats is the only state suffering most by the rain shadow effect and is dependent more on the north east monsoon which is erratic and fails frequently. Even when it strikes, it brings in high intensity run off in the coastal plains that cannot be stored and utilized. At best it helps recharge of groundwater .The ground water is also saline for a considerable distance from the sea coast.

7.2 Tamil Nadu State has been the State which developed its irrigation facilities earliest along with Punjab due to the hard work and foresight of the predecessors and after independence whatever sources is there it is being utilised storing in small tanks unmindful of the cost. Thanks to the early expansion of the power net work, in the rural areas, Tamil Nadu has the largest number of energised wells (1.4 million) and that is substantially catering to the irrigation needs. Present irrigation coverage is to be raised at least to 50%.

Future for irrigation development lies in modernising the existing system, repairing and improving them for functional efficiency and above all through better management of the available water resources. Steps on these lines have already been taken and for the past two to three decades the concentration is only on modernisation and consolidation. Adopting measures on water saving, expanding the use of micro irrigation through drips and sprinklers are to be given more attention. Installation costs in these cases are to be brought down to encourage the farmers to take to these measures.

7.3 Attention is to be also now paid on water regulation and control through enacting the Irrigation Bill and also a Ground Water Law. Several attempts made to introduce legislation on these to enforce better utilisation of the available waters has not borne fruit so far. Very soon, the circumstances will force this issue and the decision makers will feel the need of time.

More than 200 years back Benjamin Franklin once said. *"When the well is dry, we know the worth of Waters"*. Therefore, we have to take positive action before the well goes totally dry.

For the future to be really prosperous in irrigated agriculture 'Formal Joint Management' of the bureaucracy and the beneficiary is a must and it is towards this there is a lot of effort on all quarters now in introducing the Participatory Irrigation Management (PIM) programme

Annex-4.1

CHANNELS BUILT BY CHOLA KINGS

Sl. No.	Name of Channel	Right Side(R) Left Side (L)	No of Channels	Size of head regulator	Area of Ayacut
1	Rajakomarapalayam channel	L	7	0.91 m x 091 m (3 ft x 3 ft)	4,130 ha (10,203 ac)
2	Mohanur channel	L	2	1.83 m x 0.91 m (6 ft x 3 ft)	1,046 ha (2,583 ac)
3	Kattuputhur channel	L		Open head	1,943 ha (4,798 ac)
4	Ayyan channel	L	3	1.22 m x 1.52m (4 ft x 5 ft) and 1.83 m x 1 52 m (6 ft x 5 ft)	5,963 ha (14,729ac)
5	Peruvalai channel		4	1.66 m 1.52 m (5.5 ft x 5 ft)	8,074 ha (19,942 ac)
6	Srirangam Nattu Voikkal Channel	L	2	2 21 m x 0.91 m (7.25 ft x 3 ft) and 1.52 m x 1 22 m (5 ft x 4 ft)	1,379 ha (3,406 ac)
7	Pugalur channel *including popular* Mudaliar channel	R	2	1.52 m x 1.22 m (5 ft x 4.0 ft)	2,031 ha (5,016 ac)
8	Vangal channel	R	2	1.83 m x 1 37 m (6 ft x 4.5 ft)	590 ha (1,458 ac)
9	Nerur channel	R	3	1.83 m x 1.37 m (6 ft x 4.5 ft)	762 ha (1,882 ac)
10	Krishnarayapuram Channel	R	2	1.37 m x 0.99 m (4.5 ft x 3.25 ft)	488 ha (1,205 ac)
11	New Ayyan channel	R	1	1.83 m x 084 m (6 ft x 2.75 ft) and 1.52 m x 0.84 m (5 ft x 2.75 ft)	542 ha (1,338 ac)
12	Ramavathalai channel	R	2	1.0 m x 0 84 m (3.3 ft x 2. 75ft)	654 ha (1,615 ac)
13	Puthuvathalai channel	R	1	3.45 m x 0 84 m (11.4 ft x 2.75 ft)	1,265 ha (3,125 ac)
				Total	**28,867 ha (71.300 ac)**

ANCIENT IRRIGATION TANKS IN TAMIL NADU

Sl. No.	Name and Location	Period	Name of the Builder/Donor	Ayacut served	Remarks
1.	Mahendra tataka Mahendravadi village in the North Arcot district	Ist - half of 7th Century	King Mahendra Varman-I	194 ha (479 ac)	This tank must have been much larger originally than that of Kaveripakkam and served several lands some 10 to 12 km distant. Since forming earth dams for high storage had not been technically developed, the high bund made should have breached once or twice after which they should have brought down the storage height in stages. This is evident from the structural features of the bund now seen at different levels and the waste weir stepped down.
2.	Parameswara tataka in the village Kuram about 15 Km west of Kancheepuram in Chingleput district	2nd Half of 7th Century AD	Parameswara Verma - Great Grandson of Mahendra Varman-I	254 ha (628 ac)	This tank has supplementary source through a feeder channel from river Palar. An inscription says that 108 families reuting the four Vedas were residing in that village. The Pallava Kings who ruled from Kancheepuram should have settled these vedic Pundits in that village all because of the prosperity the tank brought to the region.
3.	Kethanayakkanpudur Peri Eri Sakkilichi Eri Omalur Tank Salem district	7th Century AD	Nali D/o Sri Kidangal Kuniyar.	42 ha (104 ac)	
4	Tiraliyaneri, now called Tenneri tank in the village Tenneri about 16 km to the east Kancheepuram in Chingleput district	1st half of 18th Century AD	Tirayan the Pallavan King	2,372ha (5,558 ac)	From a copper plate grant of Nandivaram Pallava Malla. There is a reference to the construction of this large tank and the peoples efforts to dig irrigation channel therefrom.

5.	Kaveripakkam Tank Kaveripakkam village in Walaja taluk in North Arcot district.	710-751 AD	Nandivarman-III	2,672 ha (6,600 ac)	There is a belief that this tank was constructed to fulfill the desire of a recluse. This is one of the largest tanks in the State with long bound running north to south and a battery of surplus weirs and surplus regulators. It serves the land in as may as village, who all cooperate in managing the waters of the tank to the best advantage of all concerned. This is being fed from river Palar by a feeder taking off on the left flank of the Palar Anicut canal Though the Palar anicut is much later, this feeder canal existed for centuries before as a open head channel. But it is not clear whether the open head Kaveripakkam channel was also excavated as the tank was constructed. With the construction of the Palar anicut in the supply to this large tank got well stabilised.
6.	Ongur Eri Tindivanam Taluk	745 AD	Nandivarman-II	127 ha (313 ac	
7.	Marbidugu Perungkinaru	8th Century	Nandivarman-II	---	
8.	Thiruvellarai taluk Tiruchi district Vairamegha Tank	775-826 AD	Same Pallava King Danti Pattarasar who Ruled soon after arranged for Improvements.	---	
9.	Gudimallam Tank in Gudimallam Village in the North Arcot district.	775-826 AD	Same Pallava King	12 ha (30 ac)	Dantikarma Varman a Pallava King is reported to have endowed a gift of land the proceeds from which is to be spent on desiliting the tank.
10	Vallieri, Pudukottai district.	793 AD	Vallivadugan, A chief of Dantivarman	---	--

11.	Dharmapuri Tank in Dharmapuri taluk in Dharmapuri district	Some time in the 9th Century	----	---	A mutilated inscription of 878AD seen in Dharmapuri confirms that during the reign of Nolamba, a Pallava King, a private individual was entrusted with the repairs to the tank.
12.	Solapuram tank near Solapurm village, Vellore, North Arcot district.	9th Century AD	Kampavarman Pallava King	202 ha (499 ac)	A Vishnu temple built on this tank was at that time called Kanakavalli Eri. Vishnu was the presiding deity of Pallavas.
13.	Chitramegha Tank Mamandur, Chengalpattur MGR	9th Century AD	Some Pallava King	---	The tank and a cave nearby seem to have been in existence in Pallava times.
14.	Marpidugeri, Alampakkam, Tiruchirapalli district.	800 AD	Dantivarman	---	
15.	Velleri and Tumbaneri, North Arcot district	844 AD	Dantivarman	18 ha (45 ac)	
16	Kilavaneri Settur, Ramanathapuram district	9th Century	Iruppaikkudi-kilavan, a Chief of Srivallabha	120 ha (298 ac)	
17.	Arimadaeri Narttamalai Pudukottai district	9th Century	Mallan Vidaman a Chief under the Pallavas	---	
18	Gundar Er. Tiruchi.	9th Century	Adiththa Chozhan	---	
19	Tandalam Tank in Tandalam Village near Arkanam North Arcot district	2nd half of 9th Century	Some Pallava King.	68 ha (167 ac)	This tank gets a feed from the Palar Anicut through the Mahendravedi channel, which takes off on the left flank of Palar Anicut.
20.	Marudadueri Wandiwash, North Arcot, Ambedkar district	867 AD	Nrpaturigavarman	302 ha (746 ac)	
21	Pullaneri, Ramanathapuram	862-880 AD	Nakkan Pullan, A Chief of Varaguana-II	---	

22.	Ukkal Tank North Arcot district.	944 AD	Paranthaka-I	198 ha (490 ac) ---	
23.	Colavardini Sholinghur, North Acrot district	914-915 AD	Some Chola King		Chola King Paranthaka-I seems to have given some grant for the maintenance to this tank.
24.	Vinnamangalam Tank Vinnamanagalam North Acrot district	920-921 AD	Some Pallava King	147 ha (362 ac)	
25.	Takkolam tank in Takkolam village in North Arcot district	937 AD	Some Pallava King	173 ha (428 ac)	Now this tank gets a feed from the Palar Anicut through Mahendravadi channel taking off on its left.
26.	Veeranarayana Tank near Kattumannar South Arcot district	Ist half of 10th Century	Paranthaka Chola	18219 ha (0 8 TMC) (45,000ac)	Paranthaka Chola-I founded the Veeranarayan Chaturvedi-mangalam and formed this tank also which is one of the large tanks in Tamil Nadu. It gets a feed from the Lower Anicut on Cauvery through the Veeranam Supply Channel. The channel should have existed as an open head channel from Coleroon much earlier than the construction of the Lower Anicut in 1836. There are reasons to believe that this supply channel should have been excavated even as the tank was formed for otherwise they could not have arranged such a large ayacut under the shallow tank
27.	Nangavram Tank, Nangavaram Village, Kulittalai taluk, Tiruchirapalli district.	Middle of 10th Century	Some Chola King		
28.	Kaliyaneri, Annamalai district	940 AD	Paranthak-I		
29.	Putteri, Paranur, Thirukkolur taluk, South Arcot district	10th Century	Aditya-I	149 ha (368 ac)	
30.	Melvalai big tank Thirukoviloor taluk, South Arcot district	920 AD	Madhana Konda Gopura Kesari		

31.	Perumal Eri, Cuddalore taluk, South Arcot district	10th Century	Chola	2,633 ha (6,503 ac)	
32.	Kavirnadu Tank, Tiruvepur Pudukottai district	994 AD	Raja Raja-I	352 ha (870 ac)	
33.	Big Tank, Bahur, Pondicherry district	996 AD	Raja Raja-I		
34.	Gangaikonda Cholapuram Tank	1012-1044 AD	Rajendra Chola-I		After his victory over the Kings in the north upto and beyond Ganga, to commemorate this great victory Rajendra Chola created this tank and built a town called Gangai Konda Cholapuram. This tank is one of the large tanks in Tamil Nadu with a 25km long bund.
35.	Arikesarimangalam Tank, Tirunelveli district	1011 AD	Raja Raja-I		
36	Pazhangoor Eri, Thirukoviloor South Arcot district	11th Century		154 ha (381 ac)	
37.	Thirukulathur Chitteri Thirukoviloor taluk, South Arcot district	11th Century			
38.	Aamoor big Tank Thirukoviloor, South Arcot district	11th Century		176 ha (435 ac)	
39	Suriyur Mela, Kanmoi Kulathur taluk, Pudukottai district	11th Century	Uthama Chozhan		
40.	Arasamalai, Kanmoi, Thirumayam taluk	11th Century	Rajendra Chozhan	41 ha (102 ac)	
41.	Siruthandi Kanmoi Thirumayam taluk	11th Century	Sri Arangan Periyan & Sri Munaiyan Thanneeran		
42	Pannaiyan Kanmoi Thirumayam taluk	11th Century	Irangal Meettan Pazhayaroyan & Avaiyan Chozhan Singa Peraiyan		

43.	Thrunarun Kondai Kundavai Pereri Thirukoviloor taluk South Arcot district	11th Century	Raja Rajan-I	
44.	Serkurichi Eri Ulundurpet taluk South Arcot district	12th Century	Vikrama Chozhan	62 ha (153 ac)
45.	Kottiyoor Tank Kulathur taluk Pudukottai district	12th Century	Kulothunga Chozhan	
46.	Peyal Tank Kulathur taluk, Pudukottai district	12th Century	Kulothunga Chozhan	45 ha (110 ac)
47.	Kavi Nattu, Kanmoi Kavinadu Kanmoi Pudukottai district	12th Century	Komaran Sadayan	378 ha (934 ac)
48.	Kidangil Eri Tindivanam taluk	12th Century	Panai Poongizhar Tambikumaran	
49.	Sembarambakkam Eri Kunrathur. Chingleput district	1216-1256 AD	Raja Raja-III	5,353 ha (13,223ac) 3,120Mcft
50.	Neyveli big Tank Thirumayam taluk	13th Century	Nakkanootri.	140 ha (345 ac)
51	Sevalur Tank Thirumayam taluk	13th Century	Pandiyan	62 ha (152 ac)
52.	Chinna Kollapattin-kinaru Thirumayam taluk	13th Century	Sree Mara Sree Vallavan	—

DISTRICTWISE LIST OF TANKS IN TAMIL NADU

Sl. No.	Name of District	In-charge of Panchayat Unions			In-charge of Public Works Deptt.			Ex-zamin Tanks	Total
		Less than 20 ha	From 20 ha to 40 ha	Total (ha)	Rainfed Tanks (ha)	System Tank * (ha)	Total (ha)		
1.	Chengalpattu	1241	542	1783	1202	5	1207	756	3746
2	North Arcot	1482	602	2084	632	537	1169	482	3735
3.	South Arcot	1213	553	1766	573	184	757	79	2602
4	Salem	449	100	549	188	-	188	-	737
5.	Dharampuri	1451	128	1579	98	3	101	154	1834
6	Coimbatore & Periyar	42	22	64	57	2	59	-	123
7.	Thanjavur	338	153	491	5	680	685	-	1176
8	Pudukkottai	4609	725	5334	369	161	530	58	6394
9.	Tirichi				173	85	258	214	472
10	Madurai & Anna	3142	249	3391	288	483	771	331	4493
11.	Pasumpon, Muthuramalingam Ramanathapuram & Kamarajar	642	691	1333	1378	130	1508	73 67	10208
12.	Tirunelveli Kattabomman & Chidambaranar	806	159	965	289	397	686	445	2096
13	Kanyakumari	1062	12	1074	24	960	984	-	2058
14.	Nilgiris	-	-	-	-	-	-		-
15	Madras	-	-	-	-	-	-	-	
	Total	**16477**	**3936**	**20143**	**5276**	**3627**	**8903**	**9886**	**39202**

Includes tanks having ayacut less than 40 ha also

A NOTE ON THE VEERANAM TANK

The Veeranam Tank, known by the name Veeranarayanan Tank in Ancient days is situated on the east coast, north of Coleroon, the flood arm of the river Cauvery, about 30 km to the west of Chidambaram, the famous town of pilgrimage for saivaites.

This tank is unique in that

(a) It is conceived, planned and executed as an on-line storage for flood canal called Vadavar taking off from Coleroon arm of river Cauvery above the Lower Coleroon Anicut.

(b) Lying in the east-coast plains, it is vast in its extent measuring about 24 km north south and 8 km east west with a catchment of 425 sq.km. (165 sq. miles) but with a capacity of only about 40.8 Mcum (1441 Mcft.) as in 1923.

(c) It serves an ayacut of as large as 20,000 ha (49,440 acres) not so much from the yield of its own catchment but from the continuous feed from the Vadavar flood channel branching of from Coleroon river and running for 22 km and

(d) It is the tank with the largest ayacut in Tamil Nadu though it is not the biggest tank in capacity.

There is no authentic version on the ruler who created this tank. But it is largely believed that it was formed during the rule of Paranthaka Chola (First half of 10th century) one of the valiant rulers of the Chola dynasty. Some say it was created by his son Rajasiddhar. Whoever has done, he has done a good job and created an asset to the farming community over a large extent of wet command, which is being maintained for so many decades and also progressively developed. It is said to have had an ayacut of 8907 ha (22,000 acres) in 1985 which has now grown to 20,000 ha (49,440 acres) presently. The FTL of the tank is said to have been raised by .06 (2 ft) from RL+43.50 (13.27 m) to RL+45.50 (13.87 m) during the period 1906-1923 increasing the capacity of the tank from 918 Mcft to the present capacity of 1441 Mcft. (40.8 Mcum), when the Vadavar supply channel was also simultaneously widened to draw more of flood surpluses.

However, the capacity is again coming down as seen from the few silt surveys undertaken.

Year	Capacity assessed in Mcum
1923	40.80 (1441 Mcft)
1960	31.20 (1102 Mcft)
1972	27.95 (987 Mcft)
1982	26.34 (930 Mcft)

Efforts are being taken to desilt to offset the capacity lost by silting

The tank bund is 16 km long and carries 28 sluices with as many irrigation channels drawing supplies for irrigation. Because the terrain is flat it is also possible to command even in the foreshore and to facilitate this and also protect a few hamlets in the foreshore, a foreshore bund 8 km long which carries another 6 sluices for irrigation has been formed. Paddy is the main crop in the command under this tank and betal wine is grown in a small area at the southern end of the tank.

A new sluice called Veeranam New Supply sluice has been opened on the northern end of the main tank bund to supply to Sethiathope Anicut system in the adjacent Vellar basin for stabilising the ayacut of 15,385 ha (38,000 acres) under that system.

Three regulators and one surplus weir on the southern end and one more regulator on the northern end are provided as the surplus arrangements for the tank. The surplus from the southern end will flow back in to Coleroon while the surplus from the northern end will flow into Vellar.

The water management in this tank is largely by the beneficiary following the Kudimaramath tradition. Of course the maintenance of the tank bund and the structures is by the Irrigation Department. Of the 26 irrigation channels, only one major channel, Buthangudi channel, was being maintained by the department while the rest were maintained by the beneficiary till 1974 when four more channels were added on to the responsibility of the department. The rest are still being taken care of by the beneficiaries and their association. Some of these channels are exclusively for irrigation while some serve as irrigation cum drainage channels.

On the whole, this Veeranam tank system is an ideal provision to harness the surpluses occurring in the Coleroon not necessarily from the Mettur flood surpluses, but also from the run off in the intermediate catchment below Mettur and also that generated from the intensive rainfall experienced in the coastal zone.

MAJOR IMPROVEMENT OF WORKS DONE IN CAUVERY DELTA SYSTEMS BETWEEN 1890 TO 1945

1890-91
Improvements to the Vaduvagudi surplus weir were under execution. Providing screw shutter to the Devanadhi dam across the Vettar was completed. Improvements to the masonry dam in Panguni and Iyen channels were carried out.

1893-94
Improvements to the Vadugachery dam across Kaduvayar were in progress; the dam was completed and the bank remained to be completed.

1894-95
Raising the Vadugachery dam banks; an incomplete work of the previous year, were completed.

1895-96
1. Constructing regulator of nine vents across the Vettar below the off-take of the Odamboghiar and improvements to the Nairangadi dam across the Odamboghiar on Kodamurti were in progress and completed during 1897-98.
2. Providing screw gear shutters for the three central arches of the Kdoamurti regulator, constructing a dam across the Pudumanniya for the irrigation of high level lands of Gopalasamudram and other villages and constructing Alianar drainage sluice on Thirumalairajan left bank were in progress.

1899 - 1900
Improvements to the Mulliyar, Marakakorayar channel and Malaperumalai dam were completed.

1910-11
(1) Fitting the Valagani bridge across the Vellayar with screw-gearing shutters. The works was completed during the year at a cost of Rs. 36,900.
(2) Improvements to the Palavar drainage. This is for converting seven dam into regulator.
(3) Improvements works to the Adappar were completed.
(4) Reconstructing the damaged portion of the Grant Anicut. The work was completed during the year, the outlay incurred being Rs. 64,100.

1916-17
(1) Improvements to the Pilla Voikal No.3 (Estimate Rs.65,910). The work was practically completed.
(2) Improvements to the Vellapalem Uppanar (Estimate Rs. 53,000) completed during the year 1918-19.
(3) Improvements to the Marakakoryar (Estimate Rs. 11,600)
(4) Improvements to Kannappamulai Calingulah across the Kodaliar (Estimate Rs. 7,150)
(5) Improvements to the tail-end of the Vellapar (Estimate Rs. 17,500) work completed during 1919-20 at a cost of Rs.15,193/-.
(6) Constructing the Eravakkadu dam across the Vellayar into a regulator. The work was completed during the year at a cost of Rs.7.408 against the estimate of Rs. 8,500.

1918-19
(1) Improvement to Vali Odai, Rs.10,772/-
(2) Constructing a permanent gauging station at the Upper Anicut, Rs.8,950/-.
(3) Improvements to the Eravanjeri dam across the South Puthar, 6,960
(4) Excavating a new side channel from above Pandi regulator across the Marakkakorayar, Rs.10,988/-.

1920-21

Constructing a regulator across the Idayar below the *South Idayar of-take (Estimate Rs. 6,560) completed* during the year 1921-22 at a cost of Rs.6.664/-.

1921-22

(1) Improvements to the Sithianiperumal dam. Work completed at a cost of Rs.11,004/- against the estimate of Rs.13,800/-
(2) Converting the Kanjidai dam across the Nandalar into a regulator

1939-40

Constructing a regulator across the Nattar and Vanjiyar at the bifurcation. The work was completed constructing a regulator across the Cauvery below Vikraman read. The work was completed, Rs. 13,233/-.

1940-41

Extension of Uyyakondan channel. Work started and completed during the year 1941-42, Rs.13,653/-.

1941-42

Extension and Improvements to Orathur channel No. 3

1943-44

(1) Providing a direct source of supply to Konakodungalar. The scheme is intended to afford better irrigation facilities to about 1,085 ha (2,680 acres) besides improving drainage of certain lands. The works was almost completed Rs.13,372/-.
(2) Providing irrigation facilities for the Padugai lands between the Cauvery and the Kodamurutti. The work has been completed, Rs.1,66,778/-

1944-45

(1) Providing irrigation facilities for certain lands in Vanarangudi and Satnur villages. The work has been completed at a cost of Rs.12,764/-.
(2) Extending Irrigation under Cauvery-Kondanar in Prathaparamapuram village. The work has been completed at a cost of Rs.15,414/-.
(3) Improvements to Karungalar dam. The works has been completed, Rs.5,410/-

Compulsory Labour (1858 : Gen. Act 1.)

ACT No. I of 1858[1]

[THE [2](TAMIL NADU) COMPULSORY LABOUR ACT, 1858]

[Received the assent of the Governor-General on the 20th January 1858]

An Act to make lawful compulsory labour for the prevention of mischief by inundation and to provide for the enforcement of customary labour on certain works of irrigation in the [3][State of Tamil Nadu]

Preamble WHEREAS the safety of person and property is endangered by inundation caused by sudden breaches of the embankments of tanks, rivers and canals and of anicuts and other tanks, rivers, and canals, and of anicuts and other like works; and it is necessary for the common good to make it obligatory on person [4][ ] when duly called upon, to unite their labour to prevent such breaches, or to repair them instantly, and whereas it is expedient to make legal provision for the enforcement of the duty, which by local custom is incumbent on village-communities, to furnish the labour required for the execution of certain works for the purpose of irrigation and drainage; It is enacted as follows :—

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1. The short title, "The Madras Compulsory Labour Act. 1858 was given by the Repealing and Amending Act, 1901 (Central Act XI of 1901)

   This Act was declared by the Laws Local Extent Act, 1874 (Central Act XV of 1874). Section 4 and the Second Schedule to be in force in the whole of the State of Tamil Nadu except the territories mentioned in the Sixth Schedule to that Act.

   This Act was extended to the merged State of Pudikkottai by section 3 of, and the First Schedule to, the Tamil Nadu Merged State (Laws) Act, 1949 (Tamil Nadu Act XXXV of 1949)

   This Act was extended to the Kanvakumari district and the Shencottah taluk of the Tirunelveli district by section 3 of and the First Schedule to, the Tamil Nadu (Transferred Territory) Extension of Laws Act, 1960 (Tamil Nadu Act 23 of 1969), which came into force on the 1st April, 1961, repealing the corresponding law in that territory

2. These words were substituted for the word "Madras" by the Tamil Nadu Adaptation of Laws Order, 1869, as amended by the Tamil Nadu Adaptation of Laws (Second Amendment) Order, 1869, which came into force on the 14th January 1869.

3. This expression was substituted for the expression "Presidency of Fort St. George" by the Tamil Nadu Adaptation of Laws Order, 1970, which was deemed to have come into force on the 14th January 1869.

4. The words of the labouring clauses" were omitted by the Adaptation (Amendment) Order 1950.

1. Whenever it shall appear to the officer in-charge of any tank, river or canal. Or of any anicut or other like work, that there is imminent danger in certain of the embankment of such tank, river or canal being be called upon breached, or of a breach being made in such anicut or other work, and of a destructive inundation being caused thereby, which may be prevented by a large body of [2][persons] immediately working together to strengthen the embankment or other work, or when such a breach has occurred, if it shall appear to such officer that it can be repaired, and the inundation caused by it be stopped, by the immediately employment of a large body of [2][persons] for that purpose, it shall be lawful for such officer to require the head or heads of the village or villages in the vicinity to call upon [3][all adult able bodied male persons of an apparent age of not less than eighteen years of an more than forty-five years in such village] or villages to co-operate in the work necessary for preventing or repairing the breach, as the case may be.

[1]{Adult able-bodied male persons) may, in certain cases, be called upon to assist in preventing or repairing breaches in embankments and anicuts

In the absence of the said officer, it shall be lawful for the Tahsildar of the taluk to make such requisition in his stead.

And if neither the said officer nor the Tahsildar is on the spot, and the emergency is great and urgent it shall be lawful for the head of the village in which the breach is expected to occur or has occurred, of his own motion to call upon [4][all such able-bodied male persons] of his own village, and, if needful, to make a requisition to the heads of the neighbouring village to call likewise upon [5][such able-bodied male persons] of their villages, to co-oper ate in the work necessary for preventing or repairing the breach.

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[1] These words were substituted for the words "Able-bodied male persons" by the Tamil Nadu Compulsory Labour (Amendment) Act 1964 (Tamil Nadu Act 19 of 1964)

[2] This word was substituted for the word "Labourers" by the Adaptation (Amendment) Order of 1950

[3] These words were substituted for the words "All able-bodied male person in such village" by the Tamil Nadu Compulsory Labour (Amendment) Act, 1964 (Tamil Nadu Act 19 of 1964)

[4] These words were substituted for the words "all able-bodied male persons" by the Tamil Nadu Compulsory Labour (Amendment) Act, 1964 (Tamil Nadu Act 19 of 1964).

[5] These words were substituted for the words "the able bodied male persons" by *ibid.*

Punishment for refusing of neglecting to comply with such call.

2. [1][Any such able-bodied male person] [2][being duly called upon by the head of his village to labour as aforesaid who shall refuse or neglect to comply with such call without any lawful excuse shall, on conviction before a Magistrate, by punished with a fine which may extend to one hundred rupees, or with simple imprisonment which may extend to one month, or with both.

Rate of the remuneration

3. Every person who shall be employed on such work, under such requisition shall be paid for his labour by day at the highest rate paid in the neighbourhood for similar work and, if he is required to work at night, at double such rate.

Mode of payment

4. Payment shall bed made to [3][such persons] from the public treasury, and, if [4][they] shall have been employed upon a work belonging to a private person, the amount advanced from the treasury shall be recoverable from such person by the same means which may be lawfully used for the recovery of arrears ofland-revenue.

Recovery of advances from private persons. Requisition for the supply of materials etc., from Villagers.

[5] [5. It shall be lawful for heads of villages, on the requisition of the officer in charge of such works, as aforesaid, or in his absence, on the requisition of the Tahsildar or is case of emergency when neither such officer nor the Tahsildar on the spot, of their own motion, to make requisition upon the inhabitants of their villages for the supply of materials, to wit earth, stone, trees and leaves, bamboos, straw, gunny bags and the like necessary for preventing or repairing breaches in the embankments of tanks, rivers an canals, and to remove or seize, and, if necessary, to cut down such materials wherever they may found, giving receipts for them in writing such materials shall be paid for from the public treasury at the highest prices for which they are sold in the neighbour hood and in case damage is sustained by any person in consequence of the removal, seizure or cutting down of any such materials, compensation shall, in case of dispute, be determined in the same manner as amounts payable under section 6. When the work for which such materials are used belongs to a private person, the amount advanced from the treasury shall be recoverable from him by the same means by which arrears of land revenue are recoverable]

These words were substituted for the words "any male person" by *ibid.*.

. The words "of the labouring classes" were omitted by the adaptation (amendment) order of 1950.

3. These words were substituted for the words "the labourers" by the Adaptation (Amendment) Order of 1950.

4. This Words was substituted for the words "the labourers" by *ibid*

5 This section was substituted for the original section by section 2 of the Madras Compulsory Labour (Amendment) Act. 1935 (Madras Act IX 1935)

[1][6. (1) Every person owning lands served by any irrigation or drainage work or any connected some therewith shall, whenever required by public notice by the head of the village under the orders of the Tahsildar or other superior Revenue officer contribute labour for repairing or properly maintaining any work connected with such irrigation or drainage work.

Liability of persons refusing to contribute Labour to the maintenance of irrigation and drainage works.

(2) Every public notice given under sub-section (1) shall be in writing over the signature of the head of the village, shall contain the names of the persons bound to contribute the labour together with such other particulars as may be necessary to identify them and the period or periods during which the labour should be contributed, and shall be widely made known in the village by affixing copies thereof in conspicuous public places within the village or by publishing the same by beat of drum and by any other means that the head of the village may think fit Every such notice shall also be published by affixture in the notice board of the offices of the Tahsildar or other Revenue Officer under whose orders the notice was given.

(3) Any person required to contribute labour in pursuance of notice given under sub-section (10) may, in lieu of such labour, pay such sum and within such time as may be specified in that behalf by a general or special order of the Tahsildar or other Revenue Officer referred to in sub-section (1) The amount so payable shall, in case of dispute, be determined summarily by the Collector.

(4) If any person who is bound to contribute labour in pursuance of a notice given under sub-section (1) neglects or refuses to contribute labour during the period specified in that notice or fails to pay the value of the labour under sub-section (3), it shall be lawful for the head of the village under the orders of the Tahsildar or other Revenue Officer referred to in sub-section. (1) to proceed at once to execute the work by employing some other person and all the expenses incurred in respect thereof together with a sum equal to the value of the labour not contributed shall be borne by the person so neglecting or refusing to contribute or failing to pay.

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[1] This section was substituted for the original section by section 2 of the Tamil Nadu Compulsory Labour (Amendment) Act, 1958 (Tamil Nadu Act VIII of 1956) This section as substituted by the said Act in so for as it related to the rest of this State was extended to the added territories by section 4 of And the Second Schedule to the Tamil Nadu (Added Territories) Extension of Laws Act, 1963 (Tamil Nadu Act 14 of 1962)

(5) Where there are a number of persons liable to pay under the preceding sub-section, the Tahsildar or other Revenue Officer under whose orders the notice was given under sub-section (1) shall, after such enquiry as he may deem necessary, apportion such expenses among the persons who are, as aforesaid, liable to bear the same and also determine the value of the labour not contributed. Such liability shall, as for as practicable, be apportioned among such persons in proportion to the extent of the lands actually served by the irrigation or drainage work or other work in connection with which the contribution of labour was required.

(6) All sums due under this section shall be payable on demand and on non-payment, the same may be recovered by the same means by which arrears of land revenue are recoverable.]

PLAN-WISE IRRIGATED POTENTIAL CREATED IN TAMIL NADU UNDER MAJOR, MEDIUM AND MINOR PROJECTS

Sr. No.	Plan Period	Potential in '000 ha
I.	**First Plan (1951-52 to 1955-56)**	
1.	Lower Bhavani Project. (Part)	67.57
2.	Mettur Canals (Part)	7.28
		74.85
II.	**Second Five Year Plan (1956-57 to 1960-61)**	
1.	Lower Bhavani Project	11.34
2.	Mettur Canals	10.93
3.	Manimuthar Reservoir	8.09
4.	Amaravathi Reservoir	8.70
5.	Sathunar Reservoir Stage-I	8.50
6.	Krishnagiri Reservoir	3.64
7.	Vedur Reservoir	0.89
8.	Valagi Reservoir (Part)	7.61
9.	N.K. H.L.C. (Part)	4.86
10.	Pullambadi Canal	6.07
		70.63
III.	**Third Five Year Plan (1961-62 to 1965-66)**	
1.	Vaigai Reservoir	1.30
2.	N.K. H. L. C.	3.48
3	Pullambadi Canal	2.87
4.	Neryyar Project (II Stage)	2.35
5.	Sathanur Reservoir	2.02
6.	Gomukhinadhi Reservoir	2.02
7.	Parabikulam Aliyar Project (Part)	13.19
		27.23
IV.	**Annual Plan (1966-67 & 1967-68)**	
1.	Parambikulam Aliyar Project (Part)	30.34
2.	Manimukthanadhi Reservoir (Part)	0.61
		30.95
V.	**Fourth Five Year Plan (1969-70 to 1973-74)**	
1.	Parambikulam Aliyar Project (Part)	13.52
2.	Manimukthanadhi Reservoir	1.01
3.	Chitar- Pattanamkal	14.93
4.	Ramanadhi Reservoir	0.21
5.	Gantana nadhi Reservoir	0.40
6.	Pennaniar Reservoir	0.74
		30.81

VI. Fifth Five Year Plan (1974-75 & 1977-78)		
1	P.A. P. (Part)	31.17
2	Parappalar Reservoir	0.41
3	Thanadaral Reservoir	0.57
4	Nandan Channel	0.17
5	Pilavukkal	1.07
6	Chinnar Reservoir	0.76
7	Pkaruppanadhi Reservoir	1.17
8	Mod Vaigai Channels	4.05
9	Palar- Parandalar	4.08
10	Vattamalaikari Odai	1.20
11	Varatupallam Reservoir	1.21
12	Gunderipallam Reservoir	0.92
13	Varadhamanadhi Reservoir	0.19
14	Maudhanadhi Resvoir	1.20
		48.17
VII Annual Plans (1978-79 & 1979-80)		
1.	P.T. Rayan Channel	0.68
2	Stahunur right canal and from pick up anicut	4.65
3	Maraudhanadhi Reservoir (Part)	0.33
		5.66
VIII Sixth Five Year Plan (1990-91 to 1984-85)		
1.	PAP (final Part)	6.52
2	SRBC (final Part)	2.00
3	Gundar	0.04
4	Thimbalahalli	0.92
5	Pambar (under DPAP)	1.62
6	Mod of Periyar- Vaigai phase-I	10.00
7	Uppar Reservoir	0.72
8	Vembakottai	3.28
9	Kullur Sandai	1.17
10	Ichambadi Anicut	2.53
11	Sulangu- Chinnar	0.71
		29.50
IX Seventh Five Year Plan (1985-86 TO 1989-90) (Major & Medium)		
1	Thoppaiyar	4.31
2	Siddhamalli	1.70
3	Noyyal Reservoir	3.90
4	Vaniar	3.46
5	Mod Anandanar Channel 2 its branches	1.86
6	C.E. (P.V.P)	7.83

7	Analmaduvu	2.81
8	Kuthirayar (Par)	1.56
9	Kodaganar Reservoir Reconstruction	1.00
		28.43
Minor		
1	Nagavathy	1.61
2	Kesarigulihalla	1.62
3	Thiruparappu Anicut	0.19
4	Anaikuttam (M.I. Scheme)	1.82
5	Perumpallam	1.40
6	Golwarpalli (part)	2.66
7	Karia Koil	2.67
		11.97
X. Annual Plan (1990-91) Major & Medium		
1	Improvements to Periyar Vaigal	0.496
2	Orathupalayam	4.200
3	Kodaganar Reservoir Reconstruction	1.065
4	Kelavarapalli	1.000
		6.761
Minor		
1	Chinnavedampatti	**0.227**
XI.	**Annual Plan (1991-92) Major & Medium**	
1	Periyar Vaigal Phase II	0.010
2	Kodaganur Reservoir Reconstruction	1.725
3	Kelavarapalli	2.240
		3.975
Minor		
1	Chennampatti Anicut	**0.490**
XII.	**Eighth Five Year Plan (1992-93 TO 1996-97) Major & Medium**	
1	Periyar Vaigai Phase – II	**2.695**
Minor		
1	Madurandagam High Level Canal	0.211
2	Shunmuganadhi Reservoir	0.664
3	Sothuparai Reservoir	0.432
4	Kodumudiyar Reservoir	0.787
5	Polgalyar Reservoir	0.259
6	Nambiyar Reservoir	0.337

7	Adavinainarkoil Reservoir Scheme	0.714
8	Rajathopukanar Reservoir Scheme	0.017
9	Mordhana Reservoir	0.285
10	Vadakkupachaiyuaru Reservoir	
11	Shenbagathope Reservoir	
12	Andiappanoor Odai Scheme	
13	Pachaiyar Scheme (Anna Distt.)	
14	Solasulahalli Reservoir	1.500
15	Doddahalla Reservoir	
16	Musukondanathi Reservoir	
17	Anicut a/c Gridhmal near Ambalathadi	0.190
18	Anicut a/c Gridhmal near Athikulam	
		5.396

Annex-6.2

PLAN-WISE DEVELOPMENT OF MAJOR, MEDIUM AND MINOR IRRIGATION PROJECTS (ANICUTS/ RESERVOIRS HAVING CCA 2000 ha.)

Figures in '000 ha

SL No.	PLAN PERIOD		POTENTIAL			UTILISATION		CUMULATIVE
			MAJOR & MEDIUM	MINOR	CUMULATIVE	MAJOR & MEDIUM	MINOR	
1.	Pre-Plan	(upto 1951)	1101	____	1101	1101	____	1101
2.	First Plan	(1951-56)	75	____	1176	57	____	11583
3.	Second Plan	(1956-61)	71	____	1247	64	____	1222
4.	Third Plan	(1961-66)	27	____	1274	39	____	1261
5.	Annual Plan	(1966-69)	31	____	1305	23	____	1284
6.	Fourth Plan	(1969-74)	31	____	1336	39	____	1323
7.	Fifth Plan	(1974-78)	48	____	1384	41	____	1364
8.	Annual Plan	(1978-80)	6	____	1390	11	____	1375
9.	Sixth Plan	(1980-85)	30	____	1420	33	____	140
10.	Seventh Plan	(1985-90)	28	12	1460	34	9	1451
11.	Annual Plan	(1990-91)	6.76	0.23	1466.99	2.41	3.93	1457.34
12.	Annual Plan	(1991-92)	3.98	0.49	1471.46	6.78	0.23	1464.33
13.	Eighth Plan (Anticipated)	(1992-97)	2.695	5.396	1479.551	____	____	____

Annex- 6.3

PLANWISE OUTLAY IN IRRIGATION & FLOOD CONTROL SECTOR

(Rs. in millions)

Sl. No.	Plan Period		Expenditure	% share to total	Cumulative Expenditure
1.	First Plan	(1951-56)	201.5	25.06	201.5
2.	Second Plan	(1956-61)	175.6	9.35	377.1
3.	Third Plan	(1961-66)	314.6	9.06	691.7
4.	Annual Plan	(1966-69)	125.4	4.71	817.1
5.	Fourth Plan	(1969-74)	282.9	5.06	1100.0
6.	Fifth Plan	(1974-78)	596.5	7.16	1696.5
7.	Mid-Term Plan	(1978-82)	407.1	5.72	2103.6
8.	Sixth Plan	(1980-85)	1613.3	4.43	3716.9
9.	Seventh Plan	(1985-90)	3437.4	5.44	7154.3
10.	Annual Plan	(1990-92)	1673.7	5.16	8828.0
11.	Eighth Plan (Anticipated Exp)	(1992-97)	5850.0	5.74	14678.0

SALIENT FEATURES OF PROJECTS TAKEN-UP IN THE PLAN PERIOD

1. LOWER BHAVANI RESERVOIR (BHAVANI SAGAR RESERVOIR)

Lat. : 11° 39' N **Long : 77° 05' E**

General		**Spillway**	
River	Bhavani	Vents	9 Nos., 10.97m x 6.10 m
Basin	Cauvery	Crest	274.32 m
Nearest Town	Mettupalayam	Type	Lift gates
District	Periyar	Discharge capacity	3143 cumecs
Construction period	1948-55		
Cost	Rs. 1034 lakhs	**River Sluices**	
Reservoir		Vents	9Nos., 1.83m x 3.05m
Catchment area	4200 sq. km.	Sill	+248.41 m
Design flood	4043 cumecs	Discharge	899 cumecs
F. R. L / M.W.L	+280.42 m		
Area at F.R.L	78.76 sq. km.	**Canal Sluices**	
Capacity at F.R.L. Gross	929 Mcum	Vents	5 Nos., 1.83m x3.05 m
Net	908 Mcum	Sill	+256.03 m
		Discharge	65 cumecs
Dam			
Type of dam	Masonry-cum-Earth dam	**Canal**	
Top of roadway	+285.08 m	Length	200 km
Maximum height	62.0m	F.S. Discharge	65 cumecs
Length Earth dam	8333 m	**Ayacut**	83772 ha
Masonry	464 m	District benefited	Periyar and Tiruchi

2. MANIMUTHAR RESERVOIR

Lat : 8° 39' 30" N **Long : 77° 26' E**

General		**Spillway**	
River	Manimuthar	Vents	7 Nos., 12.19m x 4.57 m
Basin	Thambaraparani	Crest	+ 104.55 m
Nearest Town	Ambasamudram	Type	lift gates.
District	Nellaikattabomman	Discharge	1710 cumecs
Construction period	1951-58		
Cost	Rs.505 lakhs	**River Sluices**	
		Vents	4 Nos., 1.52 m x 18.3 m
Reservoir		Sill	+73.15 m
Catchment area	161.61 sq km.	Discharge	21.2 cumecs
Design flood	1699.20 cumecs		
F.R.L.	+109.12 m	**Canal Sluice**	
M.W.L.	109.12 m	Vents	3 Nos., 1.52 m x 1.83 m
Area at F.R.L.	9.40 sq.km	Sill	+ 97.54 m
Capacity at FRL Gross	156.07 Mcum	Discharge	12.60 cumecs
Net	156.07 Mcum		
		Main Canal	
Dam		Length	46 km.
Type	Masonry-cum-Earth dam	F.S. Discharge	12.6 cumecs
Tope of roadway	+112.17m		
Maximum height	45.72m	**Ayacut**	8093.89 ha
Length : Earth dam	2552.7m	District benefitted	Nellaikattbomman
Masonry	273.1m	Taluks benefited	Ambasamudram, Tirunelveli Nanguneri, Tiruchendur and Srivaikundam

Note : Apart from the main canal sluice, there are 2 other sluices, one to feed the Perungal channel and the other to discharge into odai feeding a few tanks

3. AMARVATHI RESERVOIR

Lat : 10° 25' N — Long : 77° 16' E

General		**Spillway**	
River	Amaravathi	Vents	9 Nos., 10.97m x 7.62 m
Basin	Cauvery	Crest	+350.52 m
Nearest Town	Udumalpet.	Type	Lift Gates
District	Coimbatore	Discharge	4062 cumecs
Construction period.	1953-58		
Cost	Rs. 334 lakhs		
		River Sluices	
Reservoir		Vents	5 Nos., 1.52m x 1.83m
Catchment area	839 sq.km	Sill	+330.71 m
Design flood	4061 cumecs	Discharge	237.89 cumecs
F.R.L./M.W.L.	+358.15 m		
Area at F.R.L.	8.50 sq km	**Canal Sluices**	
Capacity at FRL Gross	114.61 Mcum	Vents	2 Nos., 1.52m x 1.83m
Net	112.37 Mcum	Sill	+334.37 m
		Dischrage	13.59 cumecs
Dam			
Type	Masonry-cum-Earth dam	**Canal**	
Tope of roadway	+360. 88 m	Length	63 km.
Maximum height	50.00 m	F.S. Discharge	8.5 cumecs
Length : Earth dam	770. 23 m		
Masonry	325.22 m	**Ayacut**	8700.93 ha
		Districts benefited	Coimbatore and Periyar
		Taluks benefited	Udumalpetand Dharapuram

Note : Apart from the main canal, there is another sluice in the earth dam to feed the existing Ramakulam and Kallapuram channels.

4. VAIGAI RESERVOIR

Lat : 10° 03' N — Long : 77° 05' E

General		**Spillway**	
River	Vaigai	Vents	7 Nos., 12 19 m x 4.7 m
Basin	Vaigai	Crest	+274.5 m
Nearest Town	Periyakulam	Type	Lift gates
District	Madurai	Discharge capacity	1674 cumecs
Construction period	1954-59		
Cost	Rs.330 lakhs	**River Sluices**	
Reservoir		Vent	7 Nos., 1.52 m x 2.74 m
Catchment area	2253.3 sq km.	Sill	+256.03 m
Design flood	1780.2 cumecs	Discharge	452.55 cumecs
F. R.L.	+279.2 m		
M.W.L..	+279.2 m	**Ayacut**	9645.89 ha
Area at F.R.L	24.19 sq. km	Districts benefitted	Madurai, Ramanathapurm
Capacity at F.R.L Gross	194.78 Mcum	Taluks benefited	Melur, Thirumangalam, Tirupathur & Sivaganga
Net	193.84 Mcum		
Dam		**Thirumangalam Canal**	
Type	Masonry-cum-Earth dam	Length	28.3 km.
Top of roadway	+282.24 m	FS Discharge	5.86 cumecs
Maximum height	33.83 m		
Length : Earth dam	3243.07 m		
Masonry dam	231.66 m		

Note: This reservoir was formed to store Periyar flows and also summer power drawal from Periyar Dam so as to benefit 9645.89 ha comprising of 4627.26 ha in Periyar New Extn. area lying on the fringes of the existing Periyar ayacut on the left side of Peranai Regulator below the Reservoir and 5018.61 ha fed by Tirumangalam main canal, on the right side of the Peranai regulator. Out of the Periyar flows 42.5 Mcum is to be allowed for Madurai Corporation for water supply.

5. SATHANUR RESERVOIR

Lat : 12° 11' N — **Long : 78° 50' E**

General

River/Basin	Ponniar
Nearest Town	Thiruvannamalai
District	Tiruvannamalani Sambuvarayar
Construction period	1954-58
Cost (including II Stage)	Rs 318.00 lakhs

Reservoir

Catchment area	10825.78sq. km.
Design Flood	5664 cumecs
F.R.L / M.W.L.	+222.20 m
Area at F.R.L.	20.10 sq km.
Capacity at F.R.L Gross	228.91 Mcum
Net	228.91 Mcum

Dam

Type	Masonry-cum-Earth dam
Top of roadway	+224.64 m
Maximum height	44.81 m
Length : Earth dam	359.66 m
Masonry	426.72 m

Spillway

Vents	9 Nos., 12.19m x 6.10 m
Crest	+216.10 m
Type	Lift gates
Discharge capacity	3143 cumecs

Saddle

Vents	7 Nos., 12.19m x 4.57 m
Crest	+217.63 m
Discharge	2142 cumecs
Type	Lift gates

River Sluices

Vents	5 Nos., 1.52m x 1.83 m
Sill	+185.93 m
Discharge	240.49 cumecs

Canal take off from the pick-up Anicut lower down

L.B. Canal

Length	35.4 km
Discharge	11.3 cumecs

R.B. Canal

Length	28.64 km.
Discharge	7.08 cumecs

Ayacut

L.B.C.	9712.5 ha
R.B.C	8498.4 ha
Districts benefited	Tiruvannamalani Sambuvarayar & South Arcot

Note : The spillway gates were erected under the II stage in 1966. The Right Bank Canal was excavated under a separate scheme during 1976-80 at a cost of Rs. 465 lakhs.

6. KRISHNAGIRI RESERVOIR

Lat : 12° 28' N — **Long : 78° 11' E**

General

River/Basin	Ponniar
Nearest Town	Krishnagiri
District	Dharmapuri
Construction period	1955-58
Cost	Rs 202 lakhs

Reservoir

Catchment area	5428.43 sq. km
Design flood	4234 cumecs
F.R.L	483.11 m
M.W.L	484.63 m
Area at F.R.L.	12.48 sq. km.
Capacity at FRL Gross	66.10 Mcum
Net	66.10 Mcum

Dam

Type	Masonry-cum-Earth dam
Top of roadway	+487.38 m
Maximum height	29.26 m
Length : Earth dam	712.93 m
Masonry	277.67 m

Spillway

Vents	8 Nos.,12.19m x 6.10 m
Crest	+477.01 m
Type	Lift gate
Discharge capacity	4061 cumecs

River Sluices

Vents	3 Nos.,1.52m x1.83 m
Sill	+467.26 m
Discharge	172.75 cumecs

Canal Sluices

Left side

Vents	1 No.,1.52m x 1.83 m
Sill	+474.73 m
Discharge	2.83 cumecs

Right side

Vents	1No.,1.22m x 1.22 m
Sill	+474.73 m
Discharge	2.83 cumecs

Canal

Left side

Length	18.5 km
F.S. Discharge	2.83 cumecs

Right side

Length	13.7 km
F.S. Discharge	2.83

Ayacut	3642.25 ha
Taluk benefited	Krishnagiri
District benefited	Dharmapuri

7. VIDUR RESERVOIR

Lat : 12°5' N | Long : 79°35' E

General		**Spillway**	
Rive/Basin	Varananadhi	Vents	9 Nos., 10.97m x 4.57 m
Nearest Town	Villupuram	Crest	33.22 m
District	South Arcot	Type	Lift gates.
Construction Period	1958-1959	Discharge capacity	1907 cumecs
Cost	Rs. 89 lakhs		
Reservoir		**River Sluices**	
Catchment area	1298.00 sq.km	Vents	2 Nos., 1.52 m x 183 m
Design flood	1786.43 cumecs	Sill	+ 28.04 m
FRL	+37.80 m	Discharge	55.05 cumecs.
M. WL.	+37.80 m		
Area at F.R.L.	7.98 sq.km.	**Canal Sluices**	
Capacity at F.R.L. Gross	17.13 Mcum	Vents	2 Nos., 1.22m x 1.83m
Net	17.13 Mcum.	Sill	+32.04 m
		Discharge	3.54 cumecs
Dam		**Canal (Left)**	
Type	Earth Dam	Length	17.7 km
Top of Roadway	+40.23 m F.S.	Discharge	3.5 cumecs
Maximum height	22.55 m		
Length: Earth dam	4379.98 m	**Ayacut**	
		Tamil Nadu	890.33 ha
		Pondicherry	404.69 ha

8. UPPER NIRAR RESERVOIR (PARAMBIKULAM ALIYAR PROJECT)

Lat : 10° 17' N | Long : 77°1' E

General		**Dam**	
River	Nirar	Type	Masonry dam
Basin	Periyar	Top of roadway	1159.76 m
Nearest Town	Pollachi	Maximum height	2591 m
District	Coimbatore	Length	132.59 m
Construction period	1970-75		
Cost	Rs.105 lakhs		
Reservoir		**Spillway**	
Catchment area	75.11 sq.km	Vents	4 Nos., 9.75 m x 1.83 m
Design flood	1069.36 cumecs	Crest	1153.67 m
F.R.L.	+1158.24 m	Type	Radial gates 55 4.57
M.W.L.	+1158.24 m	Discharge capacity	1069.36 cumecs
Area at F.R.L.	0.08 sq.km.		
Capacity at F.R L. Gross	1.10 Mcum	**River Sluices**	
Net	1.10 Mcum	Vents	2 Nos., 1.52 m x 1.83 m
		Sill	1139.95 m
		Discharge	76.97 cumecs

Note : The waters are diverted to Sholayar through an unlined 6.09 m horse shoe type tunnel of 4267 m length. From there the waters are taken to Aliyar and Tirumurthy Reservoir for irrigation through Parambikulam Dam and Sirkapathy Power House

9. LOWER NIRAR RESERVOIR
(PARAMBIKULAM ALIYAR PROJECT)

Lat : 10°16' N. **Long : 76° 59 E**

General

River	Nirar
Basin	Periyar
Nearest Town	Pollachi
District	Coimbatore
Construction period	1974-82
Purpose	Irrigation & Power
Cost (including tunnel)	Rs. 240 lakhs

Reservoir

Catchment area	37.2 sq. km
Design flood	1303.29 cumecs
F.R.L.	+1021.08 m
M.W.L.	+1021.08 m
Area of F.R.L.	0.52 sq km
Capacity at F.R.L. Gross	7.76 Mcum
Net	4.93 Mcum

Dam

Type	Masonry-cum-Earth dam
Top of roadway	+ 1024.13 m
Maximum height	50.29 m.
Length : Earth dam	14.02 m
Masonry	174.96 m

Spillway

Vents	3 Nos., 11.5 m x 7.5 m
Crest	1013.58 m
Type	Lift gates
Discharge	1303.29 cumecs

River Sluices

Vents	1 No., 1.52 x 1.83 m
Sill	1007.36 m
Discharge	33.05 cumecs

Note : The waters are diverted to Sholayar through a partially lined 6.7 m (22 ft) 'D' shaped tunnel of 8047.94 m (26404 ft) length. From there the waters are taken to Aliyar and Tirumurthi Reservoirs for irrigation through Parambikulam Dam & Sirkapathi Power House

10. SHOLAYAR RESERVOIR
(PARAMBIKULAM ALIYAR PROJECT)

Lat : 10°18 N **Long 76° 53' E**

General

River	Sholayar
Basin	Chalakudi
Nearest Town	Pollachi
District	Coimbatore
Construction Period	1961-71
Purpose	Irrigation and Power
Cost	Rs. 11.25 lakhs

Reservoir

Catchment area	121.72 sq km
Design flood	1474.7 cumecs
F.R.L.	+1002.79 m
M.W.L.	+1004.32 m
Area at F.R.L.	5.26 sq km
Capacity at F.R.L. Gross	152.70 Mcum
Net	143.07 Mcum

Dam

Type	Masonry-cum-Earthdam
Top of roadway	+1007.36 m
Maximum height	105.16 m
Length Earth dam	899.16 m
Masonry	345.03 m

Spillway

Vents	3 Nos., 12.80 m x 7.62m
Crest	995.17 m
Type	Lift Gates
Discharge	1474.7 cumecs

River Sluices

Vents	
Sill	1 No., 1.52 m x 183 m
Discharge	969.26 m
	52.73 cumecs

Power

Sholayar Power House I	2. x 35 M.W
Sholayar Power House II	1 x 25 M.W.

Note : Tail race of Power House II goes to Kerala while that of Power House -I goes to Parambikulam Dam. Power House - I is situated at the end of a lined tunnel of 2.75 m (9ft) horse shoe type and 2.577 m (8390 ft) length From Parambikulam the waters are taken to Aliyar and Thriumurthi Reservoir for irrigation through Sirkarpathi Power House.

Special : The highest Dam in Tamil Nadu.

11. PARAMBIKULAM RESERVOIR (PARAMBIKULAM ALIYAR PROJECT)

Lat : 10° 22' N **Long : 76°46' E**

General		**Dam**	
River	Parambikulam	Type	Masonry-cum-Earth dam
Basin	Chalakudi	Top of roadway	+559.31 m
Nearest Town	Pollachi	Maximum height	+73.15 m
District	Coimbatore	Length Earth dam	579.12 m
Construction Period	1959-67	Masonry	318.21 m
Cost	Rs.347 lakhs		
Reservoir		***Spillway***	
Catchment area	230.50 sq.km.	Vents	3 Nos., 12.80 m x 8.30m
Design flood	1687.31 cumecs	Crest	547.96 m
F.R.L.	+556.26 m	Type	Lift gates
M.W.L.	+556.26 m	Discharge capacity	1687.3 cumecs
Area at F.R.L	20.72 sq.km.		
Capacity at FRL Gross	504.66 Mcum	**River Sluices**	
Net	379.71 Mcum	Vents	1 No., 1.52 m x 1.83m
		Sill	512.06 m
		Discharge	60.75 cumecs

Note : The waters are let into Tunkadavu Reservoir through an unlined 5.1 m (16.75 ft) horse shoe shaped tunnel of 2480 m (8136 ft.) length. From there, it is taken to Aliyar and Thirumurthi Reservoir for irrigation through the Sirkarparthi Power House.

12. THUNAKADAVU RESERVOIR (PARAMBIKULAM ALIYAR PROJECT)

Lat : 10°25' N **Long : 76° 46' E**

General		**Reservoir**	
River	Thunakadavu	Catchment area	43.35 sq km
Basin	Chalakudi	Design flood	495.25 cumecs
Nearest town	Pollachi	F.R.L.	+ 539.50 m
District	Coimbatore	M.W.L	+ 539.50 m
Construction period	1963-65	Area at F.R.L.	4.32 sq km
Cost	Rs. 57.13 lakhs	Capacity at F.R.L. Gross	15.77 Mcum
		Net	9.06 Mcum
Dam		**Spillway**	
Type	Earth dam	Vents	3 Nos., 8.53 m x 4.57m
Type of roadway	542.24 m	Crest	531.88 m
Maximum height	25.91 m	Type	Lift gates
Length	313.94 m	Discharge capacity	495. 25 cumecs

Note : This is connected to Peruvaripullam reservoir through a small open channel of 571.5 m length . Thus. It receives waters from Parambikulam Dam and Peruvaripallam Reservoir. From Thunacadavu, waters are taken to Sirkarpathy Power House through a lined 3.66 m horse shoe type tunnel of 3850 m length. The installed power capacity of Sirkarpathy Power House is 1 x 30 MW. The tail race waters feed Sethumadia canal benefiting 2014 ha, the Aliyar feeder canal benefiting 1887 ha and the contour canal. The contour canal of 53.10 km length tails into the Thirumurthy reservoir. It has a carrying of 32.57 cumecs. In this canal provision is also made to feed Aliyar reservoir, if necessary.

13. PERUVARIPALLAM RESERVOIR
(PARAMBIKULAM ALIYAR PROJECT)

Lat : 10° 26' N | **Long : 76° 46' E**

General		**Reservoir**	
River	Peruvaripallam	F.R.L.	+539.5 m
Basin	Chalakudi	M.W.L	-539.5 m
Nearest town	Pollachi	Area at F.R.L.	2.90 sq.km
District	Coimbatore	Capacity at F.R.L Gross	1756 Mcum
Construction period	1965-71	Net	11.02 Mcum
Cost	Rs. 34.50 lakhs		

Reservoir		**Dam**	
Catchment area	15.80 sq km	Type	Earth dam
Design flood	93.46 cumecs	Top of roadway	542.24 m
		Maximum height	27.74 m
		Length	466.34 m

Note : This is connected to Thunakadavu reservoir through an open channel of 571.5 m (1875 ft.) length. Thus, these two are balancing reservoirs. This reservoir has no outlets of its own.

14. ALIYAR RESERVOIR
(PARAMBIKULAM ALIYAR)

Lat : 10°29' N | **Long 76° 58' N**

General		**Spillway**	
River	Aliyar	Vents	11 Nos., 9.14 m x 3.05 m
Basin	Bharathapuzha	Crest	316.99 m
Nearest Town	Pollachi	Type	Radial gates
District	Coimbatore	Discharge capacity	1160 cumecs
Construction period	1959-62		
Cost	Rs.297 lakhs		

Reservoir		**River Sluices**	
Catchment area	196.83 sq. km	Vents	2 Nos., 1.52 m x 1.83 m
Design flood	1160 cumecs	Sill	283.46 m
F.R.L.	+320.04 m	Discharge	110.28 cumecs
M.W.L.	+320.04 m		
Area at F.R.L.	6.5 sq. km	**Canal Sluices**	
Capacity at F.R.L Gross.	109.43 Mcum	*Pollachi Canal*	
Net	109.43 Mcum	Vents	2 Nos., 1.52 m x 1.83 m
		Sill	298.70 m
Dam		Discharge	8.47 cumecs
Type	Masonry cum Earth dam	*V.K. Pudar Canal*	
Top of roadway	+3224.78 m	Vents	1No., 1.52 m x 1.83 m
Maximum height	44.04 m	Sill	298.70 m
Length Earth dam	2289.05 m	Discharge	2.7.cumecs
Masonry	911.35 m		
		Ayacut	
		Pollachi Canal	9588.83 ha
		V.K. Pudur Canal	4566.57 ha
		District benefited	Coimbatore
		Taluk benefited	Pollachi

15. THIRUMURTHI RESERVOIR

Lat : 10°29' N — Long 77° 09' E

General		**Spillway**	
River	Palar	Vents	5 Nos., 7.92 m x 3.68 m
Basin	Bharathapuzha	Crest	403.86 m
Nearest Town	Udumalpet	Type	Lift gates
District	Coimbatore	Discharge capacity	448 cumecs
Construction period	1962-67		
Cost	Rs. 238.8 lakhs		
Reservoir		**River Sluices**	
Catchment area	80.29 sq. km	Vents	2 Nos.,1.52m x 1.83 m
Design flood	448.02 cumecs	Sill	389.23 m
F.R.L.	+ 407.52 m	Discharge	76.97 cumecs
M.W.L.	+ 407.52 m		
Area at F.R.L.	3.88 sq. km	**Canal Sluices**	
Capacity at F.R.L. Gross	54.80 Mcum	Vents	3 Nos., 1.52m x 1.83 m
Net	49.35 Mcum	Sill	390.14 m
		Discharge	37.07 cumecs
Dam			
Type	Earth Dam		
Top of roadway	+409.65 m	**Ayacut**	80826.79 ha
Maximum height	34.14 m	District benefited	Coimbatore & Periyar
Length	2627.99 m	Taluk, benefited	Udumalpet & Palladam

Note : The Parambikulam Main Canal benefiting 73,313.23 ha (18,1157 acs) with a carrying capacity of 29.20 cumecs (1,031 cusecs) branches off at 1.36 km from the common canal taking off from the canal sluice. At the same point the Udumalpet canal benefiting 7,513.56 ha with a carrying capacity of 7.87 cumec also branches. Another high level canal feeding 303.52 ha with a capacity of 0.28 cumecs also takes off from the foreshorc with sill at 402.34 m

16. GOMUKHINADHI RESERVOIR

Lat : 11°47'N — Long 78° 57' E

General		**Spillway**	
River	Gomukhinadhi	Vents	2 Nos., 12.19m x 6.10 m
Basin	Vellar	Crest	+ 177.09 m
Nearest Town	Kallakurichi	Discharge	695 cumecs
District	South Arcot		
Construction period	1963-65		
Cost	Rs. 121 lakhs		
Reservoir		**River Sluices**	
Catchment area	292.67 sq km	Vents	1 No., 1.52m x 1.83 m
Design flood	736.24 cumecs	Sill	+ 169.16 m
F.R.L/ M.W.L.	+ 183 18 m	Discharge	33.42 cumecs
Area at F.R.L.	3.60 sq km		
Capacity at F.R.L. Gross	15.86 Mcum	**Canal Sluices**	
Net	15.86 Mcum	Vents	1 No., 1.22m x 1.83 m
		Sill	+ 174.34 m
		Discharge	2.97 cumecs
Dam		**Canal**	
Type	Earth cum Earth dam	length	9.67 km
Type of roadway	+ 185.62 m	Discharge	2.97 cumecs
Maximum height	24.83 m		
Length	2103.12 m	**Ayacut**	2023.47 ha
		District benefited	South Arcot
		Taluk benefited	Kallakurichi

17. MANIMUKTHANADHI RESERVOIR

Lat : 11° 47' N			**Long : 78° 59' E**
General		**Regulator**	
River	Manimukthanadhi	Vents	3 Nos., 9.14m x 4.57 m
Basin	Vellar	Sill	+ 117.35 m
Nearest Town	Kallakurichi	Discharge capacity	957 cumecs
District	South Arcot		
Construction Period	1966-70	**Canal Sluices**	
Cost	Rs. 106 lakhs	Vents	
		Sill	
Reservoir		Discharge	
Catchment area	484.31 sq. km		1 No 1.22 x 1.83 m
Design Flood	926.06 cumecs		+ 121.46 m
F.R.L./ MWL	+128.32 m		3.20 cumecs
Area at F.R.L.	7.46 sq.km.	**Canal**	
Capacity at F.R.L. Gross	20.62 Mcum	Length	11.7 Km.
Net	20.62 Mcum	F.S. Discharge	3.2 cumecs
Dam			
Type	Earth dam	**Ayacut**	1618.78 ha
Top of roadway	+ 130.76 m	District benefited	South Arcot
Maximum height	20.00 m	Taluk benefited	Kallakurichi
Length	4554 m		

18. GATANA RESERVOIR

Lat : 8° 48'N			**Long : 77° 19' E**
General		**Spillway**	
River	Gatana nadhi	Vents	7 Nos., 7.62 m x 3.05 m
Basin	Tambaraparani	Crest	129.54 m
Nearest Town	Ambasamudram	Type	Radial gates
District	Nellaikattabomman	Discharge capacity	758 cumecs
Construction period	1967 -74	**River sluice**	3 Nos., 1.52 m x 183 m
Cost	Rs. 212 lakhs	Vents	106.68 m
		Sill	138.48 cumecs
Reservoir		Discharge	
Catchment area	46.46 sq. km		
Design flood.	758.98 cumecs	**Ayacut**	404.69 ha
F.R.L	+132.59 m	District benefited	Nellaikattabomman
M.W.L.	+132.59 m	Taluk benefited	Ambasamudram
	Area at F.R.L.	0.80 sq.km.	
Capacity at F.R.l. Gross	9.97 Mcum		
Net	9.97 Mcum		
Dam			
Type	Earth dam		
Top of roadway	+135.64 m		
Maximum height	32.92 m		
Length	1627.63 m		

Note : New Ayacut is in the fringes of existing ayacut. There is a sluice for feeding Arasapattu Channel and another sluice to allow supply for Vada Kuruvai Patti, ayacut.

19. RAMANADHI RESERVOIR

Lat : 8° 51' N			**Long : 77°19' E**
General		**Spillway**	
River	Ramanadhi	Vents	2 Nos., 9.14 m x 4 57 m
Ba0sin	Thambaraparani	Crest	188.67 m
Nearest Town	Ambasamudram	Type	Radial gates
District	Nellaikattabomman	Discharge capacity	295.7 cumecs
Construction period	1966 - 74	**River sluice**	
Cost	Rs. 181 lakhs	*Vadakkal*	
Reservoir		Vents	
Catchment area	16.58 Sq. km.	Sill	
Design flood	295.94 cumecs	Discharge	1 No., 1.22m x 1.83 m..
F.R.L.	+193.24 m	*Thenkal*	167.64 m
M. W.L.	+193 24 m	Vents	45.88 cumecs
Area at F.R.L.	0.39 sq. km.	Sill	
Capacity at FRL Gross	4.3 Mcum	Discharge	1No., 1.52 m x 1.83 m
Net	4.3 Mcum		178.31 m
			34.58 cumecs
Dam		**Ayacut**	202.35 ha
Type	Masonry-cum-Earth dam	Distt. benefited	Nellaikattabomman
Top of roadway	+195.38 m	Taluk benefited	Ambasamudram
Maximum height	31.09 m		
Length : Earth dam	734.57 m		
Masonry	103.63 m		

Note : The Vadakkal sluice supplies the new ayacut also.

20. CHINNAR RESERVOIR

Lat : 12°28' N			**Long : 77°16' E**
General		**Spillway**	
River	Chinnar	Vents	3 Nos . 12 19m x 4.57m
Basin	Cauvery	Crest	+667 93 m
Nearest Town	Krishnagiri	Type	Radial gates
District	Dharmapuri	Discharge capacity	769.76 cumecs
Construction period.	1971-77	**Canal Sluices**	
Cost	Rs. 203. 70 lakhs	Vents	1 No.. 1.52 m x 1.83 m
		Sill	+ 657 00 m
Reservoir		Discharge	2.83 cumecs
Catchment area	620.85 sq km	**Canal**	
Design flood	769.76 cumecs	Length	10.34 km
F.R.L. /M.W.L.	+ 672. 50 m	F.S. Discharge	1.13 cumecs
Area at F.R.L.	1.70 sq. m	**Ayacut**	756.78 ha
Capacity at FRL Gross	14.15 Mcum	District benefited	Dharmapuri
Net	13.98 Mcum	Taluks benefited	Hosur and Dharmapuri
Dam			
Type	Earth dam		
Top of roadway	+ 674. 90 m		
Maximum height	29.00 m		
Length	365.00 m		

21. MARUDHANADHI RESERVOIR

Lat : 10°15' N **Long : 77°41' E**

General		**Spillway**	
River	Marudhanadhi	Vents	2 Nos., 7.62m x 6.1 m
Basin	Vaigai	Crest	+321.26 m
Nearest Town	Dindugal Anna	Type	Radial gates
District	Madurai	Discharge capacity	420 cumecs
Construction period	1973-79		
Cost	Rs. 320 lakhs		
Reservoir		**Canal Sluices**	
Catchment area	53.35 sq km	*Left Canal*	1 No., 1.22 m x 1.83 m
Design flood	419.99 cumecs	Sill	+307.85 m
F.R.L.	+327.36 m	Discharge	1.33 cumecs
M.W.L.	+327.36 m	*Right Canal*	1 No. 1.22m x 1.83 m
Area at F.R.L.	0.72 sq.km	Sill	+307.85 m
Capacity at F.R L.	4.93 Mcum	Discharge	1.05 cumecs
Dam		*Left Canal*	
Type	Earth dam	Length	10.02 km
Top of roadway	+329.18 m	F.S. Discharge	1.33 cumecs
Maximum height	27.43 m	*Right canal*	
Length	786.38 m	Length	10.00 km
		F.S. Discharge	1.05 cumecs
River Sluices		**Ayacut**	1526.91 ha
Vents	1 No., 1.52 m x 1.83 m	District benefited	Dindugal Anna
Sill	+307.85 m	Taluk benefited	Periyakulam
Discharge	39.82		

22. KARUPPANADHI RESERVOIR

Lat : 9° 8' N **Long : 77° 18' E**

General		**Spillway**	
River	Karuppanadhi	Vents	2 Nos., 9.14 m x 4.57 m
Basin	Thambaraparani	Crest	248.41 m
Nearest Town	Tenkasi	Type	Radial gates
District	Nellaikattabomman	Discharge capacity	356.8 cumecs
Construction period	1971-77		
Cost	Rs. 273.50 lakhs	**River Sluices**	
Reservoir		Vents	1 No., 1.52 m x 1.83 m
Catchment area	29.34 sq km	Sill	231.00 m
Design flood	356.83 cumecs	Discharge	42.34 cumecs
F R L.	+253.0 m		
M.W.L.	+253.0 m		
Area at F.R.L.	0.50 m	**Ayacut**	1163.49 ha
Capacity at F.R.L Gross.	5.24 Mcum	District benefited	Nellaikattabomman
Net	5.24Mcum	Taluk benefited	Tenkasi
Dam			
Type	Masonry-cum-Earth dam		
Top of roadway	+255.44 m		
Maximum height	34.44 m		
Length : Earth dam	850.0 m		
Masonary	40.0 m		

Note · This reservoir helps stabilization of existing ayacut and bridging gap in cultivation. There is also a sluice for Perungal.

23. PONNANIAR RESERVOIR

Lat: 10°39' N | Long: 78°10' E

General		**Spillway**	
River	Ponnaniar	Vents	2 Nos., 9.45 m x 3.05 m
Basin	Cauvery	Crest	+247.19 m
Nearest Town	Manaparai	Type	Lift gates
District	Tiruchi	Discharge capacity	199.03 cumecs
Construction period	1970-74		
Cost	Rs. 100 lakhs	**River Sluices**	
		Vents	1 No., 1.52 m x 1.83 m
Reservoir		Sill	+234.70 m
Catchment area	87.02 sq. km.	Discharge	29.45 cumecs
Design flood	199.03 cumecs		
F.R.L.	+250.24 m	**Canal Sluices**	
M.W.L.	+250.24m	Vents	1 No., 1.22 m x 1.83 m
Area at F.R.L.	0.60 sq. km.	Sill	+234 70 m
Capacity at F.R.L. Gross	3.40 Mcum	Discharge	1.50 cumecs
Net	3.40 Mcum		
Dam		**Canal**	
Type	Masonry-cum-Earth dam	Length	3.5 km.
Top of roadway	+253.29 m	F.S. Discharge	1.2 cumecs
Maximum height	24.84 m	**Ayacut**	740.59 ha
Length : Earth dam	195.07m	District benefited	Tiruchi
Masonry dam	51.82 m	Taluk benefited	Manaparai

24. PERIYAR RESERVOIR (PILAVUKKAL PROJECT)

Lat : 9° 38' N | Long : 77° 32' E

General		**Spillway**	
River	Periyar	Vents	2 Nos., 9.1 m x 4.57 m
Basin	Vajppar	Crest	+199 50 m
Nearest Town	Srivilliputhur	Type	Radial type
District	Kamarajar	Discharge	283 cumecs
Construction period	1971-76	**River Sluices**	
Cost	Rs.222.43 lakhs	Vents	1No., 1 52 m x 1.83 m
		Sill	+190.00 m
Reservoir		Discharge	5 cumecs
Catchment area	45.30 sq.km		
Design flood	283.3 cumecs	**Canal sluice**	
F.R.L.	+204.52 m	Vents	1 No, 0.9 m x 1.22 m
M.W.L.	+204.52 m	Sill	+194 00 m
Area at F.R.L.	0.76 sq.km.	Discharge	0.68 cumecs
Capacity at FRL Gross	5.44 Mcum		
Net	5.44 Mcum	**Canal**	
		Length	4.20 km.
Dam		F.S. Discharge	0 784 cumecs
Type	Earth dam		
Top of roadway	+206.50 m	**Ayacut**	388.5 ha
Max.height	17.00 m	District benefited	Kamarajar
Length	864.00 m	Taluk benefited	Srivilliputhur

25. KOVILAR RESERVOIR (PILLAVUKKAL SCHEME)

Lat : 9° 40' N — **Long : 77° 35' E**

General		**Regulator**	
River	Kovilar	Vents	2 Nos., 9.14 m x 3.05m
Basin	Vaippar	Sill	208.94 m
Nearest Town	Srivilliputhur	Discharge	221 cumecs
District	Kamarajar		
Construction period	1971 - 76	**River sluices**	
Cost	Rs.222.43 lakhs	Vents	1 No.,1.52 m x 1.83 m
		Sill	199.00 m
Reservoir		Discharge	5 cumecs
Catchment area	24.77 sq. km.		
Design flood	220.8 cumecs	**Canal sluice**	
F.R.L.	+212.00 m	Vents	1 No., 1.22 m x 1.83 m
M.W.L.	+212.00 m	Sill	206.0 m
Area at F.R L.	0.74 sq.km.	Discharge	2.51 cumecs
Capacity at F.R.L. Gross	3.77 Mcum		
Net	3.77 Mcum	**Canal**	
		Length	3.20 km.
Dam		F. S. Discharge	0.374 cumecs
Type	Earth dam		
Top of roadway	+214.00 m	**Ayacut**	143.65 ha
Maximum height	16.00 m	District benefited	Kamarajar
Length	639.27 m	Taluk benefited	Srivilliputhur

26. PARAPPALAR RESERVOIR

Lat : 10° 25'N — **Long : 76° 42' E**

General		**Spillway**	
River	Parappalar	Vents	3 Nos., 9.75 m x 4.57 m
Basin	Cauvery	Crest	+550.16 m
Nearest Town	Palani	Type	Radial gates
District	Dindugal Anna	Discharge capacity	741.46 cumecs
Construction period	1971.1974		
Cost	Rs 90 lakhs		
Reservoir		**River Sluices**	
Catchment area	72.88 sq. km.	Vents	1 No., 1.52 m x 1.83 m
Design Flood	741.46 cumecs	Sill	+527.30 m
F.R.L	+554.74 m	Discharge	48.37 cumecs
M WL.	+555.65 m		
Area at F R.L.	1.14 sq. km.	**Ayacut**	404.69 ha
Capacity at F.R.L. Gross	5.6 Mcum	District benefited	Dindugal Anna & Tiruchi
Net	5.6 Mcum	Taluks benefited	Palani and Karur
Dam			
Type	Masonry Dam		
Top of roadway	+557.78 m		
Maximum height	39.62 m		
Length	81 .08 m		

Note : There is no new canal taking off from the reservoir. The new ayacut is localised under existing anicuts lower down.

Special : The Ski jump Spillway, the only one in Tamil Nadu.

27. PALAR PORANDALAR RESERVOIR

Lat: 10° 25'N **Long: 77° 29' E**

General		**Spillway**	
River	Palar-Porandalar	*Porandalar arm*	
Basin	Cauvery	Vents	2 Nos., 9.75m x 6.70 m
Nearest Town	Palani	Crest	+333.15 m
District	Dindugal Anna	Type	Lift gates
Construction Period	1971-78	Discharge	679.6 cumecs
Cost	Rs.565 lakhs	*Palar arm*	
		Vents	2 Nos., 8.53 m x 6.70 m
Reservoir		Crest	333.15 m
Catchment area	259.00 sq km	Type	Lift gates
Design flood	1217.6 cumecs	Discharge capacity	538 cumecs
FRL/M.W.L	+339.85 m		
Area at F.R. L	5.18 sq.km.	**River Sluices**	
Capacity at F.R.L Gross	43.19 Mcum	Vents	7 No., 1.52 m x 1.83 m
Net	43.19 Mcum	Sill	+320.04 m
		Discharge	383.74 cumecs
Dam			
Type	Earth dam	**Canal Sluices**	
Top of roadway	+342.29 m	Vents	1 No., 1.52 m x 1.83 m
Maximum height	32.00 m	Sill	+329.18 m
Length	2450.59 m	Discharge	4.13 cumecs
		Canal	
		Length	30.51 km
		F.S. Discharge	2.26 cumecs
		Ayacut	4079.32 ha
		District benefited	Dindugal Anna
		Taluk benefited	Palani

Note : Apart from main canal, there are two other sluices one to feed the zamin ayacut and the other to feed Thadakulam tank..

28. VARATTUPALLAM RESERVOIR

Lat : 11° 36' N **Long: 77° 16' E**

General		**Surplus arrangements**	
		Stepped byewash - right side	
River	Varattupallam	Length	65.00 m
Basin	Cauvery	Crest	+315.00 m
Nearest Town	Bhavani	Discharge	169.8 cumecs
Dstrict	Periyar	*Flush escape - left side*	
Construction period	1974-78	Length	103.50 m
Cost	Rs.192 lakhs	Crest	+315.00 m
		Discharge	113.2 cumecs
Reservoir			
Catchment area	66.82 sq km.		
Design flood	284.33 cumecs	**Canal Sluices**	
F R.L	+315.00 m	Vents.	1No , 0.91m x 1.52m
M.W.L.	+316.20 m	Sill	+304.80 m
Area at F.R.L	0.89 sq. km.	Discharge	1.03 cumecs
Capacity at F.R.L Gross	3.94 Mcum		
Net	3.94 Mcum	**Canal**	
		Length	5.925 km
		F.S. Discharge	1.03 cumecs
Dam			
Type.	Earth dam	**Ayacut**	1210.44 ha.
Top of roadway	+317.70 m	District benefited	Periyar
Maximum height	15.50 m	Taluk benefited	Bhavani
Length	1798 m		

29. GUNDERIPALLAM RESERVOIR

Lat : 11° 34' N | Long : 77° 18'E

General		**Canal Sluices**	
River	Gunderipallam	*Left side*	
Basin	Cauvery	Vents	1No., 0.75m x 1.52 m
Nearest Town	Erode	Silt	+287.36 m
District	Periyar	Discharge	0.54 cumecs
Construction period	1974-78	*Right side*	
Cost	Rs.153.65 lakhs	Vents	1 No., 0.75m x 1.52 m
		Sill	+287.36 m
Reservoir		Discharge	0.25 cumecs
Catchment area	72.23 sq. km.		
Design flood	299.63 cumecs	**Canal**	
F.R.L	+300.09 m	*Left side*	
M.W.L.	+301.00 m	Length	11.85 km
Area at F.R.L	0.61 sq. km	F.S. Discharge	0.54 cumecs
Capacity at F.R.L Gross.	3.06 Mcum		
Net	3.06 Mcum	*Right side*	
		Length	8.02 km.
Dam		F.S. Discharge	0.25 cumecs
Type	Earth dam		
Top of roadway	+302.83 m	**Ayacut**	1001.21 ha
Maximum height	17.70 m	District benifited	Periyar
Length	627.00 m	Taluk benefited	Gobichettipalayam
Surplus Weir			
Length	95.00 m		
Crest	+300.09 m		
Discharge capacity	299.63 cumecs		

30. GUNDAR RESERVOIR

Lat : 8° 56' 55" N | Long : 77° 13' 14" E

General		**Dam**	
River	Gundar	Type	Masonry-cum-Earth dam
Basin	Thambaraparani	Top of roadway	+83.50m
Nearest Town	Tenkasi	Maximum height	14.66 m
District	Nellaikattabomman	Length : Earth Dam	297.1 m
Construction period	1979 - 83	Masonry	92.9 m
Cost	Rs. 123 lakhs		
		Uncontrolled Weir	
Reservoir		Crest	80.00 m
Catchment area	9.92 sq.km.	Length	77.0 m
Design flood	264.51 cumecs	Discharge capacity	264.5 cumecs
F.R.L	+80.00 m		
MWL	+81.50 m	**River sluices**	
Area at F.R.L	0.21 sq. km	Vents	1No., 0.90 m x 1.20 m
Capacity at F.R.L Gross	071 Mcum	Sill	69.0 m
Net	0.71Mcum	Discharge	12.74 cumecs
		Ayacut	39.69 ha (gap)
		District benefited	Nellaikattabomman
		Taluk benefited	Senkottah

Note : The reservoir besides stabilising the existing ayacut helps to convert 39 .66 ha of single crop area to double crop. There is no separate canal.

31. VATTAMALAIKARAI ODAI RESERVOIR

Lat : 10° 54' N | **Long : 77° 40' E**

General		**Canal Sluices**	
River	Vallamalaikarai Odai	*Left side*	
Basin	Cauvery	Vents	1No., 0.9 m x 0.9 m
Nearest Town	Dharapuram	Sill	+ 220.0 m
District	Periyar	Discharge	1.22 cumecs
Construction period	1974-78	*Right side*	
Cost	Rs 193 lakhs	Vents	1No., 0.9 m x 0.9 m
Reservoir		Sill	+220.0 m
Catchment area	396.00 sq km	Discharge	1.22 cumecs
Design Flood	533.83 cumecs		
F.R.L.	+227.5 m	**Canal**	
M.W L	+228.5 m	*Left side*	
Area at F R.L.	0.307 sq. km.	Length	5.37 km
Capacity at FRL Gross	7.59 Mcum	F. S. Discharge	1.24 cumecs
Net	7.59 Mcum	*Right side*	
Dam		Length	3.66 km.
Type	Earth dam	F.S. Discharge	1.25 cumecs
Top of roadway	+230.90 m		
Maximum height	20.00 m	**Ayacut**	2347.23 ha
Length	1820 m	District benefited	Periyar
		Taluk benefited	Dharapuram
Surplus Weir			
Length	220 m		
Crest	+227.5 m		
Discharge	533.8 cumecs		

32. VARDHAMANADHI RESERVOIR

Lat : 10° 18' N | **Long : 77° 03' E**

General		**Dam**	
River	Varadamanadhi	Type	Earth dam
Basin	Cauvery	Top of roadway	+375 .40 m
Nearest Town	Palani	Maximum height	26.00 m
District	Dindugal Anna	Length	297 .00m
Construction period	1975-78	**Surplus Weir**	
Cost	Rs.188 lakhs	Length	58 80 m
		Crest	+371.26 m
		Discharge capacity	406.39 cumecs
Reservoir		**River Sluices**	
Catchment area	74.07 sq.km.	Vents	1 No., 1.52 m x 1.83 m
Design flood	406.39 cumecs	Sill	+351.00 m
F.R.L.	+371.26 m	Discharge	42.42 cumecs
M.W.L	+373.02 m		
Area at F.R.L.	0.39 sq km.	**Ayacut**	186.16 ha
Capacity at F.R.L. Gross	3.06 Mcum	District benefited	Dindugal Anna
Net	3.06 Mcum	Taluk benefited	Palani

Note : There is no canal taking off from the reservoir. The Project mainly contemplates stabilisation of existing ayacut and bridging the gap.

33. THAMBALAHALLI RESERVOIR

Lat : 12° 18' N — **Long : 78° 9' 22" E**

General		**River sluices**	
River	Pullambatti	Vents	1 No., 1.52m x 1.83 m
Basin	Ponniar	Sill	+462.00 m
Nearest Town	Palacode	Discharge	16.82 cumecs
District	Dharmapuri		
Construction period	1979-1983	**Canal Sluices**	
Cost	Rs.205.00 lakhs	*Left side*	
		Vents	1 No., 0.91m x 1.52 m
Reservoir		Sill	+467.00 m
Cactchment area	232.50 sq km.	Discharge	1.27 cumecs
Design flood	577.47 cumecs	*Right side*	
F.R.L./ M W.L.	+471.50 m	Vents	1 No., 0.91m x 1.52 m
Area at F.R.L	1.93 sq km.	Sill	+467.00 m
Capacity at F.R.L. Gross	3.68 Mcum	Discharge	0.42 cumecs
Net	3.68 Mcum		
Dam		**Canal**	
Type	Earth dam	*Left side*	
Top of roadway	+473.60 m	Length	8.39 km
Maximum height	12.30	F.S. Discharge	0.868 cumecs
Length	1053.50 m	*Right side*	
		Length	4.55 km
Spillway		F. S. Discharge	0.236 cumecs
Vents	3 Nos. 12.5 x 4.5 m		
Crest	+467.00 m	**Ayacut**	883.85 ha
Type	Radial gates	District benefited	Dharmapuri
Discharge capacity	577.47 cumecs	Taluk benefited	Palacode

34. PAMBAR RESERVOIR

Lat : 12° 16' N — **Long : 78° 34' E**

General		**Spillway**	
River	Pambar	Vents	5 Nos., 12.19 m x 4.57 m
Basin	Ponniar	Crest	+316.50 m
Nearest Town	Uthangarai	Type	Radial gates
District	Dharmapuri	Discharge capacity	1513.39 cumecs
Construction period	1977-1983		
Cost	Rs 248 lakhs		
		Canal Sluices	
Reservoir		Vents	1 No., 0.91 m x 1.52 m
Catchment area	1736.00 sq km	Sill	+315.00 m
Design flood	1513.39 cumecs	Discharge	1.42 cumecs
F.R.L.	+321.00 m		
M.W.L.	+321.50 m		
Area at F.R L.	2.43 sq. km.	**Canal**	
Capacity at F.R.L. Gross	7.93 Mcum	Length	29.50 km.
Net	7.02 Mcum	F. S Discharge	1.42 cumecs
Dam			
Type	Earth dam	**Ayacut**	1618.78 ha
Top of roadway	+323.50 m	District benefited	Dharmapuri
Maximum height	16.50 m	Taluks benefited	Uthangarai and Harur
Length	652.00 m		

35. VEMBAKOTTAI RESERVOIR

Lat : 9° 20' N **Long : 17° 45' E**

General		**Canal Sluices**	
River	Vaippar	*Left side*	
Basin	Vaippar	Vent	1 No., 0.9 m x 1.20 m
Nearest Town	Aruppukottai	Sill	80.50 m
District	Kamarajar	Discharge	1.264 cumecs
Construction Period	1980-85	*Right Side*	
Cost	Rs 296.00 lakhs	Vent	1 No., 0.9 x 1.20 m
		Sill	80.50 m
Reservoir		Discharge	1.264 cumecs
Catchment area	26.91 sq. km.		
Design flood	1851.9 cumecs	**Canal**	
F.R.L / M. W.L.	87.50 m	*Left side*	
Area at F.R.L.	467.69 ha	Length	16400 m
Capacity at F.R.L.	11.29 Mcum	F.S. Discharge	1.278 cumecs
		Right side	
Dam		Length	15900 m
Type	Earth dam	F.S. Discharge	1.278 cumecs
Top of roadway	89.50 m		
Maximum height	9.7 m	**Ayacut**	3279 ha
Length	3216 m	District/Taluk benefited	Kamarajar / Sattur
Surplus Regulater			
Vents	6 Nos., 11.50m x 4.50 m		
Crest	80.00 m		
Type	Ogee		
Discharge	1851.9 cumecs		

36. KULLURSANDAI RESERVOIR

Lat : 9° 23' N **Long : 77° 33' E**

General		**Canal Sluices**	
River	Vajppar	*Right Side*	
Basin	Vajppar	Vents	1No., 0.90 m x 1.50 m
Nearest Town	Aruppukottai	Sill	27.95 m
District	Kamarajar	Discharge	0 9285 cumecs
Construction Period	1980 - 84	*Left Side*	
Cost	Rs.212 lakhs	Vents	1 No , 0.90 m x 1.50 m
		Sill	27.95 m
Reservoir		Discharge	0.9285 cumecs
Catchment area	80.38 sq.km		
Design Flood	752 cumecs	**Canal**	
F.R. L / M.W.L	30.20 / 31.70 m	*Right Side*	
Area at F.R.L.	316.4 ha	Length	3500 m
Capacity at F.R..L. Gross	3.59 Mcum	F.S. Discharge	0.9285 cumecs
		Left Side	
Dam		Length	6400 m
Type	Earth dam	F.S. Discharge	0.9285 c
Top of Roadway	33.70 m		
Maximum height	8.00 m	**Ayacut**	1034 ha
Length	3207 m	District benefited	Kamarajar
		Taluk benefited	Aruppukkottai
Surplus arrangements			
Type	H.C. Weir		
Length	143 m		
Crest	30.20 m		
Discharge capacity	635.4 cumecs		

37. THOPPAIYAR RESERVOIR

Lat : 11° 57'30" N | **Long : 78° 09' E**

General		**River Sluices**	
River	Thoppaiyar	Vents	1 No., 0.90 m x 1.50 m
Basin	Cauvery	Sill	348.30 m
Nearest Town	Dharmapuri	Discharge	2.123 cumecs
District	Dharmapuri		
Construction period	1980 - 86	**Canal Sluices**	
Cost	Rs.332.00 lakhs	*Left side*	
		Vents	1 No., 1.00 m x 0.70 m
Reservoir		Sill	+338.00 m
Catchment area	276.79 sq.km.	Discharge	1.349 cumecs
Design Flood	980.69 cumecs	*Right Side*	
F.R.L. / M.W.L	363.60 m	Vents	1 No., 1.00 m x 0.60 m
Area at F.R.L.	119.89 ha	Sill	+338.00 m
Capacity at F.R.L.	8.456 Mcum.	Discharge	0.6025 cumecs
Dam		**Canal**	
Type	Earth dam	*Left Side*	
Top of Roadway	365.60 m	Length	24.20 km.
Maximum height	19.755 m	F.S.D.	1.349 cumecs
Length	435.00 m	*Right Side*	
		Length	16.475 km
Spillway		F.S.D.	0.6025 cumecs
Vents	4 Nos., 11.00 m x 6.00 m		
Crest	357.60 m	***Ayacut***	*2157 ha*
Type	Radial gates	Districts benefited	Dharmapuri and Salem
Discharge	980.69 cumecs	Taluks benefited	Omalur and mettur

38. NAGAVATHI RESERVOIR

Lat : 12° 3' 35" N | **Long : 78° 1' 40" E**

General		**Surplus arrangements**	
River	Nagavathi	Type	Ogee weir
Basin	Cauvery	length	94 m
Nearest Town	Dharmapuri	Crest	354.50 m
District	Dharmapuri	Discharge	579.414 cumecs
Construction Period	1981-86		
Cost	Rs. 178.00 lakhs	**Canal Sluices**	
		Vents	1 No., 0.90 m x 1.50 m
Reservoir		Sill	347.00 m
Catchment area	105.357 sq km.	Discharge	1.127 cumecs
Design Flood	579.414 cumecs		
F.R.L. / M.W.L	354.50 m/356.50 m	**Canal**	
Area at F.RL.	117.66 ha	*Left side*	
Capacity at F.R.L.	4.652 Mcum	Length	1.6150 km.
		F.S.D.	0.5549 cumecs
Dam		*Right side*	
Type	Earth dam	Length	10.325 km.
Top of roadway	358.50 m	F.S.D	0.5549 cumecs
Maximum height	15.810 m	**Ayacut**	806.556 ha
Length	306.00 m	District/Taluk benefited	Dharmapuri

39. KESARIGULIHALLA RESERVOIR

Lat : 12° 18' 11" N | **Long : 77° 57'30" E**

General

River / Basin	Kesarigulihalla/Cauvery
Nearest town	Beluhalli
District	Dharmapuri
Construction period	1981 - 85
Cost	Rs. 279 lakhs

Reservoir

Catchment area	52.75 sq km.
Design flood	464.165 cumecs
F.R.L.	+585.700 m
M.W.L.	+585.700 m
Area at F.R.L.	105.32 ha
Capacity at FRL Gross	3.80 Mcum
Net	3.57 Mcum

Dam

Type	Earth dam
Top of masonry	587.700 m
Meximum height	16.74 m
Length	1671.7 m

Spillway

Vents	3 Nos. 7.60 x 5.70 m
Crest	+580.22 M
Type	Lift gates
Discharge capacity	465.100 cumecs

Canal Sluices

Left side	
Vents	1 No., 1.20m x 1.80 m
Sill	+578 m
Discharge	0.859 cumecs
Right side	
Vents	1 No., 1.20 m x 1.80 m
Sill	+578.00 m
Discharge	0.15 cumecs

Canal

Left side	
Length	9.350 km.
F.S. Discharge	0.859 cumecs
Right side	
Length	5.2 km.
F.S. Discharge	0.15 cumecs

Ayacut	1618.78 ha.
District benefited	Dharmapuri
Taluk benefited	Palacode

40. UPPAR RESERVOIR

Lat : 10° 50' N | **Long : 78° 42' E**

General

River	Uppar
Basin	Coleroon (Cauvery)
Nearest Town	Lalgudi
District	Tiruchi
Construction period	1980-86
Cost	Rs. 90.00 lakhs

Reservoir

Catchment area	44.40 sq. km.
Design Flood	305.64 cumecs
F.R.L / M.W.L	88.30/89.30 m
Area at F.R.L	116.60 ha
Capacity at F.R.L	2.265 Mcum

Dam

Type	Earth dam
Top of roadway	91.30 m
Maximum height	8.87 m
Length	720 m

Surplus arrangements

Type	High Co-efficient weir
Length	126 m
Crest	88.3 m
Discharge	305.64 cumecs

Canal Sluices

Left side	
Vents	1 No., 0.90m x 1.50 m
Sill	85.00 m
Discharge	2.55 cumecs
Right side	
Vents	1 No, 0.90 m x 1.50 m
Sill	85.00 m
Discharge	7.11 cumecs

Canal

Left side	
Length	4750 m
F.S. Discharge	0.1426 cumecs
Right Side	
Length	8050 m
F.S. Discharge	0.8773 cumecs

Ayacut	722.4 ha
District benefited	Tiruchi
Taluk benefited	Lalgudi

41. PERIYAR RESERVOIR

Lat : 10° 06' N | Long : 77° 51' E

General		**Spillway**	
River	Periyar	Vents	10 Nos., 10.97 m x 4.88 m
Basin	Periyar	Crest	867.16 m
Nearest Town	Gudalpur	Type	Lift gates
District	Idukki (Kerala)	Discharge	3463 cumecs
Construction period	1887-97		
Cost	Rs.108 lakhs	**Tunnel**	
		Sill	857.40 m
Reservoir		Size	4.27 m Dia
Catchment area	601 sq. km.	Discharge	50 cumecs
Design flood	3600 cumecs	Installed Power	4 x 35 M.W.
F.R.L	+872.03 m	Capacity	
M.W.L.	+872.95 m		
Area at F.R.L	29.00 sq.km.	**Ayacut**	57,871 ha
Capacity at F.R.L Gross	443.55 Mcum	Canal length	245 km
Net	299.35 Mcum	District benefited	Madurai
		Taluk benefited	Uthamapalayam, Periyakulam, Nilakottai, Melur and Madurai
Dam			
Type	Masonry		
Top of roadway	+872.95 m		
Maximum height	53.64 m		
Length	378.26 m		

Note : This dam was constructed across Periyar river in the present Kerala State for irrigation in Tamil Nadu. This is a monumental example of Inter State co-operation as early as 19th Century. The stored waters are diverted to the eastern side through a tunnel and let into Suruliar in Cumbum valley, which joins Vaigai River. Till 1958 the waters diverted through the tunnel were exclusively utilised for irrigation. Area irrigated by the Project lies in Cumbum Valley and under Periyar Main Canal taking off from Peranai Regulator. From 1958 the waters are let into the Forebay dam for generation of power also.

42. ANAIMADUVU RESERVOIR

General		**Spillway**	
River	Anaimaduvu	Vents	3 Nos., 10.50 m x 6.10 m
Basin	Vasista nadhi	Crest	410.40 m
Nearest town	Valappadi	Type	Radial Gates
District	Salem	Discharge	911.13 cumecs
Construction period	1982-92		
Cost	Rs.1175 lakhs	**Canal Sluices**	
		Vents	1 No., 0.90 m x 1.50 m
Reservoir		Sill	+396.00 m
Catchment area	145.02 sq.km.	Discharge	1.75 cumecs
Design flood	911.13 cumecs		
F.R.L.	416.50 m	**Canal**	
M.W.L.	416.50 m	*Left side*	
Area at F.R.L.	106.81 sq.km.	Main canal length	5.70 km
Capacity at FRL Gross	7.56 Mcum	F.S.Discharge	0.62 cumecs
Net	7.42 Mcum	*Right side*	
		Main canal length	15.05 km
		F.S.Discharge	1.13 cumecs
Dam			
Type	Earth Dam		
Top of roadway	419.00 m	**Ayacut**	2119 ha.
Maximum height	27.94 m	District benefited	Salem
Length	670 m	Taluk benefited	Salem

43. CHITTAR RESERVOIR-I

Lat : 8⁰ 28' N **Long : 77⁰ 15' E**

General		**Regulator**	
River	Chittar	Vents	2 Nos., 12.19 m x 4.57 m
Basin	Kodayar	Sill	77.42 m
Nearest Town	Kuzhithurai	Discharge	408 cumecs
District	Kanyakumari		
Construction period	1963-70	**River Sluice**	
Cost (Both Chittar I & II)	Rs.190 lakhs	Vents	1 No., 1.22 m x 1.83 m
		Sill	62.79 m
Reservoir		Discharge	31.58 cumecs
Catchment area	22.01 sq. km.	Feeder Canal Slince	1 No., 1.22 m x 1.83 m
Design flood (Combined with Chittar-II)	595 cumecs	Sill	76.50
		Discharge	4.25 cumecs
F.R.L	+81.99 m	**Ayacut**	
M.W.L.	+81.99 m	Pattanamkal	6,070.42 ha
Area at F.R.L	2.93 sq.km.	Radhapuram canal	6,879.81 ha
Capacity at F.R.L Gross	17.28 Mcum	District benefited	Kanyakumari & Nellaikattabomman
Net	11.13 Mcum	Taluk benefited	Vilavankodu & Nanguneri
Dam			
Type	Earth Dam		
Top of roadway	+85.04 m		
Maximum height	21.94 m		
Length	762.0 m		

Note : This is connected to Chittar Dam-II by an inter connecting channel from Chittar Dam-II. These form part of Chittar Pattanamkal scheme. The feeder canal joins the existing Left Bank canal of Pechipparai Reservoir. Pattanamkal feeds 6070 ha in Kamyakumar Dist., while Radhapuram canal feeds 6880 ha in Tirunelveli Distt.

44. CHITTAR RESERVOIR-II

Lat : 8⁰ 26' N **Long : 77⁰ 15' E**

General		**Regulator**	
River	Chittar	Vents	6 Nos., 6.10 m x 1.22 m
Basin	Kodayar	Crest	80.77 m
Nearest Town	Kuzhithurai	Sill	Lift gates
District	Kanyakumari	Discharge	218 cumecs
Construction period	1963-70		
Cost (Both Chittar I & II)	Rs.190 lakhs	**River Sluice**	
		Vents	1 No., 1.22 m x 1.83 m
Reservoir		Type	64.01 m
Catchment area	26.16 sq. km.	Discharge	30.53 cumecs
Design flood (Combined with Chittar-I)	595 cumecs		
F.R.L	+81.99 m	**Inter-Connecting Channel To Dam-1**	
M.W.L.	+82.91 m		
Area at F.R.L	4.14 sq.km.	Sill	76.50 m
Capacity at F.R.L Gross	28.55 Mcum	Length	1005.84 m
Net	16.99 Mcum	Discharge	198.2 cumecs
Dam			
Type	Earth Dam		
Top of roadway	+85.04 m		
Maximum height	25.00 m		
Length	1075.94 m		

45. PERUNCHANI RESERVOIR

Lat : 8° 25' N **Long. : 77° 29' E**

General		**Dam**	
River	Paralayar	Type	Masonry
Basin	Kodayar	Top of Roadway	+94.18 m
Nearest Town	Nagercoil	Maximum height	36.27 m
District	Kanyakumari	Length	308.46 m
Construction period	1948-52		
Cost	Rs.147 lakhs	**Spillway**	
		Vents	4 Nos., 12.19 m x 4.57 m
Reservoir		Crest	88.70 m
Catchment area	159.46 sq. km.	Type	Lift gates
Design flood	894.91 cumecs	Discharge	895 cumecs
F.R.L	+93.27 m		
M.W.L.	+93.27 m	**River Sluices**	
Area at F.R.L	9.62 sq.km.	Length	2 Nos., 1.83 m x 2.44 m
Capacity at F.R.L Gross	81.84 Mcum	Sill	69.80 m
Net	81.84 Mcum	Discharge	139.36 cumecs

Note : This reservoir and Pechipparai reservoir feed the common ayacut viz. Kodayar system.

46. PECHIPPARAI RESERVOIR

Lat : 8° 30' N **Long : 77°. 08' E**

General		**Spillway**	
River	Kodayar	Vents	6 Nos., 12.19 m x 4.57 m
Basin	Kodayar	Crest	87.45 m
Nearest Town	Kuzhithurai	Type	Lift gates
District	Kanyakumari	Discharge	31.25 cumecs
Construction period	1895-1906		
Cost	Rs.26.07 lakhs	**Canal Sluices**	
		Vents	2 Nos., 2.13 m x 2.90 m
Reservoir		Sill	77.42 m
Catchment area	207.19 sq. km.	Discharge	28.74 cumecs
Design flood	1104.48 cumecs		
F.R.L	+92.05 m	**Canal length**	231 km.
M.W.L.	+92.05 m		25,900.44 ha
Area at F.R.L	15.15 sq.km.	**Ayacut**	
Capacity at F.R.L Gross	152.36 Mcum	District benefited	Kanyakumari
Net	126.02 Mcum	Taluk benefited	Thovala, Agastheeswaram, Kalkulam & Vilavankode
Dam			
Type	Masonry		
Top of Roadway	+94.45 m		
Maximum height	46.32 m		
Length	555.35 m		

47. GOLWARPATTI RESERVOIR

Lat : 9° 24' 10" N | **Long : 77° 58' 10" E**

General

River	Arjuna Nadhi
Basin	Vaippar
Nearest Town	Sattur
District	Kamarjar
Construction period	1982-92
Cost	Rs.981 lakhs

Reservoir

Catchment area	13.80 sq. km.
Design flood	2849 cumecs
F.R.L	62.50 m
M.W.L.	62.50 m
Area at F.R.L	347.30 sq.km.
Capacity at F.R.L	5.04 Mcum

Dam

Type	Earth Dam
Top of Roadway	+64.50 m
Maximum height	9.04 m
Length	5750 m

Spillway

Vents	13 Nos., 11.50 m x 5.50 m
Crest	+57.00 m
Type	Bed Regulator
Discharge	2848.53 cumecs

Canal Sluices

Left side

Vents	1 No., 1.50 m x 1.00 m
Sill	58.30 m
Discharge	5.09 cumecs

Canal

Length	12.20 km
F.S.Depth	I reach 1.20 m II reach 1.00 m

Ayacut

District benefited	Kamarajar
Taluk benefited	Virudhunagar

48. ANAIKUTTAM RESERVOIR

Lat : 9° 30' 30" N | **Long : 78° 4' 0" E**

General

River	Arjuna Nadhi
Basin	Vaippar
Nearest Town	Virudhunagar
District	Kamarjar
Construction period	1982-89
Cost	Rs.276 lakhs

Reservoir

Catchment area	40.83 sq. km.
Design flood	1708 cumecs
F.R.L	+95.0 m
M.W.L.	+95.0 m
Area at F.R.L	198.89 ha.
Capacity at F.R.I	6.602 Mcum

Dam

Type	Earth Dam
Top of Roadway	97.00 m
Maximum height	9.50 m
Length	2940 m

Spillway

Vents	9 Nos., 10.00 m x 2.75 m
Crest	+87.50 m
Type	Breast wall
Discharge	2166 cumecs

Canal Sluices

Right side

Vents	1 No., 0.90 m x 1.20 m
Sill	+91.00 m
Discharge	1.165 cumecs

Canal

Right side

Length	5.1 Km
F.S.D	1.165 cumecs

Ayacut

District benefited	Kamarajar
Taluk benefited	Virudhnagar

49. MANJALAR RESERVOIR

Lat : 10° 12' N **Long : 77° 38' E**

General		**Spillway**	
River	Manjalar	Vents	4 Nos., 7.92 m x 3.05 m
Basin	Vaigai	Crest	+303.28 m
Nearest Town	Periyakulam	Type	Radial gates
District	Madurai	Discharge	256.4 cumecs
Construction period	1963-67		
Cost	Rs.106.48 lakhs	**River Sluices**	
		Vents	2 Nos., 1.52 m x 1.83 m
Reservoir		Sill	+288.95 m
Catchment area	119.14 sq. km.	Discharge	74.91 cumecs
Design flood	331.34 cumecs		
F.R.L	+306.32 m	**Canal Sluices**	
M.W.L.	+306.32 m	Vent	1 Nos., 0.91 m x 1.22 m
Area at F.R.L	1.97 sq.km.	Sill	+299.62 m
Capacity at F.R.L Gross	13.48 Mcum	Discharge	1.42 cumecs
Net	13.48 Mcum		
		Canal	
Dam		Length	6.8 km
Type	Earth Dam	F.S. Discharge	1.42 cumecs
Top of Roadway	+308.76 m		
Maximum height	28.33 m	**Ayacut**	809.32 ha
Length	1004.62 m	District benefited	Madurai
		Taluk benefited	Periyakulam

50. SIDDHAMALLI RESERVOIR

Lat : 11° 04' 0" N **Long : 79° 0' 0" E**

General		**Dam**	
River	Siddamalli	Type	Earth Dam
Nearest Town	Udaiyar Palayam	Top of Roadway	+35.35 m
District	Tiruchy	Maximum height	15.15 m
Construction period	1982-87	Length	5050 m
Cost	Rs.478.90 lakhs		
		Spillway	
Reservoir		Vents	3 Nos., 8.50 m x 5.0 m
Catchment area	216.2 sq. km.	Crest	+28.25 m
Design flood	450 cumecs	Type	Ogee
F.R.L	+33.25 m	Discharge	450 cumecs
M.W.L.	+33.25 m		
Area at F.R.L	266.18 ha.		
Capacity at F.R.L	6.422 Mcum		

51. KODAGANAR RESERVOIR

Lat : 10° 35' 32" N **Long : 77° 58' 24" E**

General	
River	Kodaganar
Basin	Cauvery
Nearest Town	Vedasandur
District	Dindigul Anna
Construction period	1985-in progress
Cost	Rs.1890 lakhs
Reservoir	
Catchment area	1670 sq. km.
Design-flood	8500 cumecs
F.R.L	+200.25 m
M.W.L.	+201.75 m
Area at F.R.L	412.21 ha
Capacity at F.R.L	12.286 Mcum
Dam	
Typical	Earth Dam with Masonry Spillway
Top of Roadway	+202.75 m
Maximum height	12.75 m
Length Earth Dam	2662 m
Masonry	231 m
Spillway	
Vents (Existing)	5 Nos., 12 m x 3.05 m
(Additional)	10 Nos., 12 m x 8.25 m
Crest	+192 m
Type	Ogee
Discharge	222.22 cumecs
Canal sluices	
Left side	
Vents	1 No., 1.22 m x 1.22 m
Discharge	1.314 cumecs
Right side	
Vents	1 No., 1.52 m x 1.83 m
Discharge	4.586 cumecs
Canals	
Left side	
Length	9.40 km
F.S.Discharge	0.60 m
Right side	
Length	53.515 km
F.S. Discharge	1.00 m
Ayacut	3643.7 ha
District benefited	Dindigul Anna & Trichy
Taluk benefited	Dindigul Anna & Trichy

52. NOYYAL ORATHUPALAYAM RESERVOIR

Lat : 11° 06' 30" N **Long : 77° 32' 30" E**

General	
River	Noyyal
Basin	Cauvery
Nearest Town	Chennimalai
District	Periyar
Construction period	1984-92
Cost	Rs.1646 lakhs
Reservoir	
Catchment area	2245.53 sq. km.
Design flood	2527 cumecs
F.R.L	+248.00 m
M.W.L.	+248.00 m
Area at F.R.L	423 ha.
Capacity at F.R.L	17.44 Mcum
Dam	
Typical	Earth Dam
Top of Roadway	+250.10 m
Maximum height	16.10 m
Length	2290 m
Spillway	
Vents	6 Nos., 12 30 m x 6.70 m
Crest	241.30 m
Type	Ogee
Discharge	2527.40 cumecs
River Sluices	
Vents	1 No., 1 52 m x 1.83 m
Sill	236.00 m
Discharge	10.46 cumecs
Canal Sluices	
Left side	
Vents	0.60 m x 0.50 m
Sill	245.00 m
Discharge	0.2245 cumecs
Right side	
Vents	0.60 m x 0.50 m
Sill	245.00 m
Discharge	0.2245 cumecs
Canal	
Left side	
Length	1.68 km
F.S.Discharge	0.50 m
Right side	
Length	2.48 km
F.S.Discharge	0.50 m
Ayacut	
District benefited	Periyar
Taluk benefited	Kangeyam

53. KUTHIRAIYAR RESERVOIR

Lat : 10° 23' N | **Long : 77° 22' 30"E**

General

River	Kuthiraiyar
Basin	Cauvery
Nearest Town	Palani
District	Dindigul Anna
Construction period	1982-90
Cost	Rs.877.22 lakhs

Reservoir

Catchment area	71.40 sq.km.
Design flood	573.13 cumecs
F.R.L	386.38 m
M.W.L.	386.38 m
Area at F.R.L	59.36 ha
Capacity at F.R.L	7.163 Mcum

Dam

Type	Earth dam with Masonry
Top of Roadway	388.38 m
Maximum height	27.38 m
Length Earth Dam	800.90 m
Masonry	39.10 m

Spillway

Vents	3 Nos., 10 m x 4.5 m
Crest	381.88 m
Type	Ogee
Discharge	593.15 cumecs

River Sluice

Vents	1 No., 1.20 m x 1.80 m
Discharge	5.66 cumecs

Canal sluices

Left side

Vents	1 No., 0.90 m x 0.75 m
Discharge	0.75 cusecs

Right side

Vents	1 No., 0.90 m x 0.75 m
Discharge	0.75 cusecs

Canal

Left side

Length	3 km
F.S.Discharge	0.45 m

Right side

Length	6.87 km
F.S.Discharge	0.75 m

Ayacut	2637 ha
District benefited	Dindigul Anna & Coimbatore
Taluk benefited	Palani & Udumalpet

54. PERUMPALLAM RESERVOIR

Lat : 11° 34' N | **Long : 77° 18' 30" E**

General

River	Perumpallam Odai
Basin	Cauvery
Nearest Town	Sathiamangalam
District	Periyar
Construction period	1983-90
Cost	Rs.541 lakhs

Reservoir

Catchment area	44.53 sq.km.
Design flood	437.80 cumecs
F.R.L	312.40 m
M.W.L.	314.40 m
Area at F.R.L	65.31 ha
Capacity at F.R.L	3.28 Mcum

Dam

Type	Earth dam
Top of Roadway	315.40 m
Maximum height	17.09 m
Length	1888 m

Canal Sluices

Left side

Vents	1 No., 0.90 m x 1.50 m
Sill	303.00 m
Discharge	0.39 cumecs

Right side

Vents	1 No., 0.90 m x 1.50 m
Sill	303.00 m
Discharge	0.39 cumecs

Canal

Left side

Length	7.20 km (Lined)
F.S. Discharge	0.60 m

Right side

Length	6.30 km (Lined)
F.S. Discharge	0.40 m

Ayacut	2594.4 ha
District benefited	Periyar
Taluk benefited	Sathiamangalam

55. UPPAR RESERVOIR (PERIYAR DISTRICT)

Lat : 10° 48' N **Long : 77° 25' E**

General		**Canal Sluices**	
River	Uppar	*Left side*	
Basin	Cauvery	Vents	1 No, 0.91 m x 1.22 m
Nearest Town	Dharapuram	Sill	268.83 m
District	Periyar	Discharge	3.03 cumecs
Construction period	1965-68	*Right side*	
Cost	Rs.87.20 lakhs	Vents	1 No, 0.91 m x 1.22 m
		Sill	268.83 m
Reservoir		Discharge	2.04 cumecs
Catchment area	903.88 sq.km.		
Design flood	708 cumecs	**Canal**	
F.R.L	276.15 m	*Left side*	
M.W.L.	276.76 m	Length	10.85 km
Area at F.R.L	4.53 sq.km.	F.S. Discharge	3.0 cumecs
Capacity at F.R.L Gross	16.31 Mcum	*Right side*	
Net	14.92 Mcum	Length	12.74 km
		F.S. Discharge	2.07 cumecs
Dam			
Type	Earth dam	**Ayacut**	2452.45 ha
Top of Roadway	278.89 m	District benefited	Periyar
Maximum height	16.76 m	Taluk benefited	Dharapuram
Length	2362.2 m		
Regulator			
Vents	3 Nos., 9.14 m x 5.49 m		
Crest	270 66 m		
Discharge	730 cumecs		

56. METTUR RESERVOIR

Lat : 11° 47' N **Long : 77° 48' E**

General		*Low level Sluice*	
River	Cauvery	Vents	5 Nos., 2.13 m x 4.27 m
Basin	Cauvery	Sill	+204.216
Nearest Town	Mettur	Discharge	849.50 cumecs
District	Salem		
Construction period	1926-34	**Spillway**	
Purpose	Irrigation & Power	*Ellis Saddle Surplus*	
Cost	Rs.680 lakhs	Vents	16 Nos., 18.29 m 6.10 m
		Sill	234.696 m
Reservoir		*'F' Saddle Surplus Escape*	
Catchment area	42217 sq.km.	Length	246.9 m
Design flood	12914.6 cumecs	Sill	+241.097 m
F.R.L	+240.792 m	F.S. Discharge	11,178.5 cumecs
M.W.L.	+242.621 m		
Area at F.R.L	153.46 sq.km	**H.E. Pipes**	
Capacity at F.R.L Gross	2708.79	4 Nos.	2.59 m dia
Net	2646.77	Sill	+195.072 m
		Discharge	130 18 cumecs
Dam			
Type	Masonry	**H.E. Tunnel**	13.72 m dia
Top of Roadway	244.145 m	Sill	+217.018 m
Maximum height	70.41 m	Discharge	566 cumecs
Length	1615.4 m	**Ayacut (New)**	1,21,810 ha
High level Sluice		**Installed Capacity**	
Vents	8 Nos., 3.20 m x 4.88 m	Dam HEP	40 MW
Sill	+219.456 m	Tunnel HEP	200 MW
Discharge	1415.8 cumecs		

57. KARIAKOIL RESERVOIR

Lat : 11° 46' 30" N | **Long : 78° 34' E**

General

River	Kariakoir
Basin	Vellar
Nearest Town	Attur
District	Salem
Construction period	1982-92
Cost	Rs.1185 lakhs

Reservoir

Catchment area	70.5 sq.km.
Design flood	770.21 cumecs
F.R.L	454.00 m
M.W.L.	454.00 m
Area at F.R.L	69.40 ha
Capacity at F.R.L	5.38 Mcum

Dam

Type	Earth dam
Top of Roadway	456.00 m
Maximum height	32 m
Length	748.50 m

Spillway

Vents	3 No., 9.00 m x 6.10 m
Crest	447.90 m
Type	Radial gates
Discharge	770.21 cumecs

Canal Sluice

Left side	
Vents	0.90 m x 1.50 m
Sill	+438.00 m
Discharge	0.5713 cumecs
Right side	
Vents	0.90 m x 1.50 m
Sill	+438.00 m
Discharge	0.5713 cumecs

Canal

Left side	
Length	10.10 km
F.S. Discharge	0.620 cumecs
Right side	
Length	10.84 km
F.S. Discharge	0.620 cumecs

Ayacut	11,457 ha
District benefited	Salem
Taluk benefited	Attur

58. WILLINGDON RESERVOIR

Lat : 11° 54' N | **Long : 79° 25' E**

General

River	Periya Odai
Basin	Vellar
Nearest Town	Vridhachalam
District	South Arcot
Construction period	1913-23
Cost	Rs.23.34 lakhs

Reservoir

Catchment area	129.50 sq.km.
Design flood	66.84 cumecs
F.R.L	+72.06 m
M.W.L.	+72.61 m
Area at F.R.L	15.54 sq.km.
Capacity at F.R.L Gross	73.40 Mcum
Net	60.01 Mcum

Dam

Type	Earth dam
Top of roadway	+75.05 m
Maximum height	17.22 m
Length	4023.36 m

Spillway

Vents	30 Nos., 3.05 m x 4.27 m
Crest	+70.84 m
Type	Lift gates
Discharge	66.84 cumecs

Canal Sluices

Vents	3 Nos., 1.52 m x 1.22 m
Sill	+63.47 m
Discharge	11.87 cumecs

Canal

Length	51 km
F.S. Discharge	11.40 cumecs

Ayacut	11,197.90 ha
District benefited	South Arcot
Taluk benefited	Vridhachalam

59. KELAVARAPALLI RESERVOIR

Lat : 12° 52'42" N **Long : 77° 46' 6" E**

General

River	Ponniyar
Basin	Ponniyar
Nearest Town	Hosur
District	Dharmapuri
Construction period	1977-93
Cost	Rs.1250 lakhs

Reservoir

Catchment area	2442 sq.km.
Design flood	2490 cumecs
F.R.L	+831.50 m
M.W.L.	+831.50 m
Area at F.R.L	349.50 ha
Capacity at F.R.L Gross	13.22 Mcum

Dam

Type	Earth dam
Top of Roadway	3.65 m
Maximum height	13.5 m
Length	546.80 m

Spillway

Vents	7 Nos 12.20 m x 6.09 m
Crest	825.40 m
Type	Radial gates
Discharge	2490 cumecs

River Sluice

Vents	1 No., 1.20 m x 1.85 m
Sill	818.00 m
Discharge	0.40 cumecs

Canal Sluice

Left side

Vents	1 No., 0.80 m x 1.50 m
Sill	823.00 m
Discharge	1.92 cumecs

Right side

Vents	1 No., 0.90 m x 1.50 m
Sill	823.00 m
Discharge	0.697 cumecs

Canal

Left side

Length	25.50 km
F.S. Discharge	1.92 cumecs

Right side

Length	21.99 km
F.S. Discharge	0.697 cumecs

Ayacut

District benefited	Dharmapuri
Taluk benefited	Hosur
Water supply	6.10 MGD

60. SHOOLAGIRI CHINNAR RESERVOIR

Lat : 12° 40' 5" N **Long : 78° 2' 20" E**

General

River	Shoolagiri Chinnar
Basin	Ponniyar
Nearest Town	Shoolagiri
District	Dharmapuri
Construction period	1981-85
Cost	Rs.176 lakhs

Reservoir

Catchment area	143.62 sq.km.
Design flood	547 cumecs
F.R.L	664 m
M.W.L.	664 m
Area at F.R.L	0.4453 sq.km.
Capacity at F.R.L Gross	3.30 Mcum

Dam

Type	Earth dam
Top of Roadway	3.65 m
Maximum height	25.30 m
Length	415 m

Canal Sluice

Right side

Vents	0.9 m x 1.50 m
Sill	+654.00 m
Discharge	0.113 cumecs

Canal

Left side

Length	2.60 Km
F.S. Discharge	0.35 m

Right side

Length	8.65 Km
F.S. Discharge	0.75 m

Ayacut

	352.63 ha
District benefited	Dharmapuri
Taluk benefited	Hosur

61. VANIAR RESERVOIR

Lat : 12^0 54'38" N

Long : 78^0 20' E

General

River	Vaniar
Basin	Ponniyar
Nearest Town	Harur
District	Dharmapuri
Construction period	1979-85
Cost	Rs.1203.10 lakhs

Reservoir

Catchment area	101.76 sq.km.
Design flood	654.9 cumecs
F.R.L	471.0 m
M W.L.	471.0 m
Area at F.R.L	10.93 ha
Capacity at F.R.L Gross	11.837 Mcum
Net	11.781 Mcum

Dam

Type	Earth dam
Top of Roadway	473.10 m
Maximum height	31.17 m
Length	1136 m

Surplus Regulator

Vents	3 Nos., 12 m x 3 m
Crest	463.50 m
Type	Radial gates
Discharge	654.90 cumecs

River Sluices

Vents	1 No., 1.50 m x 1.83 m
Sill	445.00 m
Discharge	1.573 cumecs

Canal sluice

Left side

Vents	1 No., 1.5 m x 1.8 m
Sill	451.10 m
Discharge	2.41 cumecs

Canal

Left side

Length	11.40 km
F.S. Discharge	0.93 cumecs

Right side

Length	12.40 km
F.S. Discharge	1.48 cumecs

Ayacut	3460 ha
District benefited	Dharmapuri
Taluk benefited	Harur

STATEMENT OF NET AREA IRRIGATED BY SOURCES IN TAMIL NADU

area in '000' hectares **Total 100 %**

Year	Sources					Percentage Distribution			
	Canal	Tanks	Wells	Other Source	Total	Canal	Tanks	Wells	Other Source
1950-51	788.00	565.00	426.00	76 00	18 5500	42.48%	30 46%	22.96%	4.10%
1955-56	791.00	809.00	505.00	43.00	2148 00	36 82%	37.66%	23.51%	2 00%
1960-61	882.00	936 00	598 00	46.00	2462.00	35 82%	38.02%	24.29%	1 87%
1965-66	799.00	903 00	659.00	38.00	2399.00	33 31%	37.64%	27.47%	1 58%
1970-71	884.00	898 00	775.00	35 00	2592 00	34.10%	34 65%	29 90%	1.35%
1971-72	931 00	924.00	820.00	35 00	2710 00	34.35%	34.10%	30.26%	1 29%
1972-73	942.00	949 00	892 00	32 00	2815.00	33.46%	33 71%	31.69%	1 14%
1973-74	927 00	930.00	927.00	32 00	2816.00	32.92%	33.03%	32 92%	1 14%
1974-75	887.00	594.00	924 00	33.00	2438.00	36.48 %	24 36%	37.90%	1.35%
1975-76	910.00	750 00	870 00	35.00	2565.00	35 48%	29 24%	33.92%	1.36%
1976-77	676 00	800.00	825.00	28.00	2329.00	29 03%	34 35%	35.42%	1 20%
1977-78	925 00	910 00	958 00	42 00	2835 00	32.63 %	32.10%	33.79%	1.48%
1978-79	920 00	842.00	1069.00	42 00	2873.00	32.02 %	29 31%	37 21%	1 46%
1979-80	933.00	896 00	1117.00	38.00	2984.00	31.27%	30 03%	37 43%	1 27%
1980-81	889.00	590 00	1067.00	24.00	2570.00	34.59%	22.96%	41.52%	0 93%
1981-82	901 00	738.00	1045.00	25 00	2709.00	33.26%	27 24%	38.58%	0.92%
1982-83	764.00	517.00	959.00	15.00	2255 00	33 88%	22 93%	42 53%	0 67%
1983-84	865 00	807.00	926.00	20.00	2618 00	33 04%	30 83%	35 37%	0.76%
1984-85	897 00	715 00	1007.00	21.00	2640.00	33 98%	27.08%	38 14%	0.80%
1985-86	774.00	672.00	1030 00	25 00	2501.00	30.95%	26.87%	41 18%	1 00%
1986-87	819 00	510.00	1010.00	17.00	2356 00	34.76%	21 65%	42 87%	0 72%
1987-88	720 52	609.94	1091.79	15.37	2437 62	29.56%	25 02%	44.79%	0 63%
1988-89	810.36	479 03	1070 91	14 43	2374.73	34.12%	20.17%	45.10%	0 61%
1989-90	790 61	522.67	1168.57	14 81	2496.66	31.67%	20.93%	46 81%	0 59%
1990-91	769.39	530.93	1058.53	13.94	2372.79	32.43%	22.38%	44 61%	0 59%
1991-92	843 45	577 02	1167.74	16.97	2605 18	32.38%	22 15%	44.82%	0 65%
1992-93	851.46	628.83	1200.58	16.93	2697 80	31 56%	23.31%	44 50%	0 63%
1993-94	813 96	668 13	1300.35	17 12	2799 56	29 07%	23.87%	46.45%	0 61%
1994-95	844.36	674 30	1369.32	15 28	2903 26	29 08%	23.23%	47 16%	0 53%

@ includes tube-wells and wells

Source : Season and Crop Report issued by Department of Statistics, Chennai -6.

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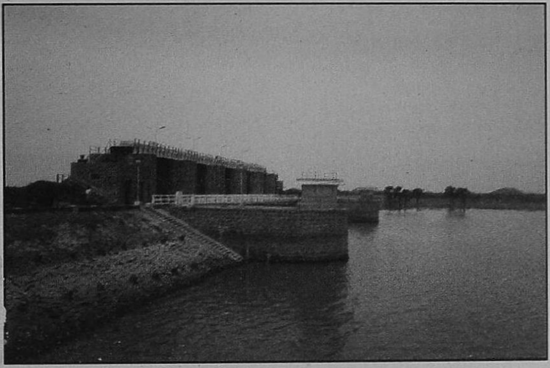

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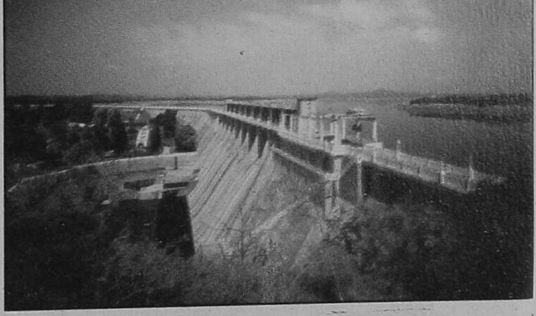

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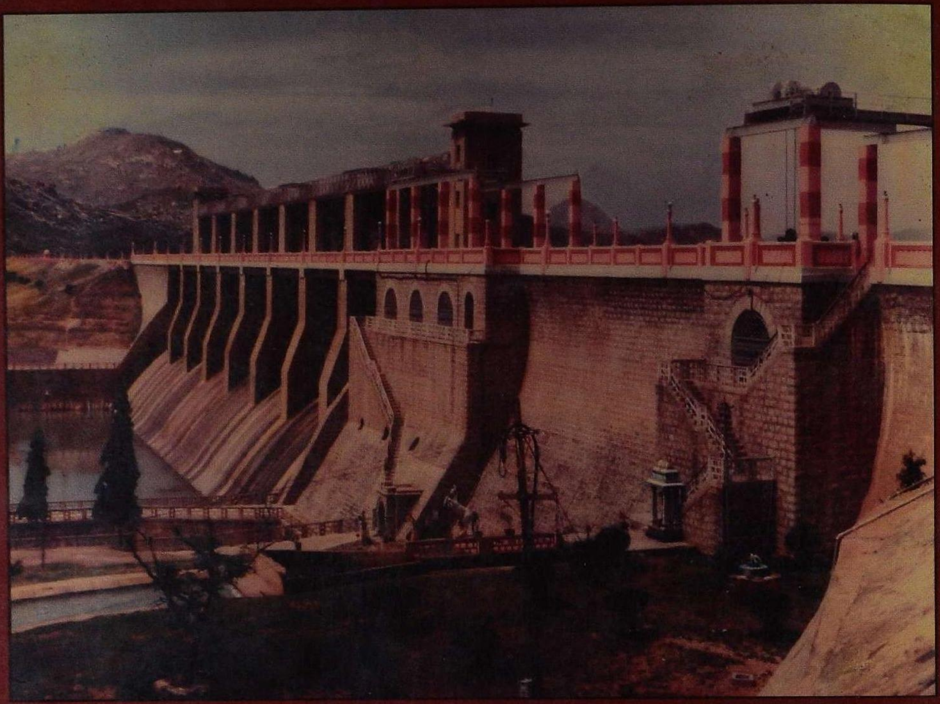

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